Telephony.

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Telephcne Statistics.

The preliminary census report on the telephone industry is something of a disappointment to those who suspect that the carelessness of a large number of companies which have failed to report has resulted in an incomplete showing, seriously affecting the totals. Such conditions as this, revealing the impossibility of obtaining information by voluntary action of the companies, even when the companies themselves will derive the chief benefits, and no disadvantages whatever from its distribution, will undoubtedly furnish the public a strong argument for universal regulation by state commissions. If we could have had more voluntary publicity of figures in the past, we should now find ourselves called upon to do much less worrying about the effects of hostile legislation which is coming up for consideration in many states.

Taking the figures as they stand, they show that the telephone industry now has a most favorable standing in a comparison of its present status with that of either of the other two great branches of electrical enterprise—lighting and traction; and in its rate of growth, surpassing its rivals for the esteem of leadership, it shows the effect of that momentum, arising from the peculiarly forceful tendency of each new addition to bring other subscribers to the system, which will at no distant period make the telephone service the most widely and densely distributed of any of our public utilities.

A comparison of leading items shows that in 1902 there were reported 9,136 telephone systems, 3,620 central (electric light and power) stations, and 987 electric railway companies. The percentage of increase to 1907 was, for electric railway systems, 25.2; for central stations 30.2; and for telephone systems, 151.4. Persons familiar with the rapid increase of rural telephone service might venture a prediction that investments in the respective industries would not be at all proportionate to the increase in the number of systems; but the discrepancy of ratios is by no means great; the natural expansion of existing systems bringing the rate of increase in authorized telephone capitalization above the rate of organization of new enterprises—a condition not observed in the other electric industries, showing the confidence of the telephone managers that growth will continue at a rapid rate for some time to come. The actual figures available show the total cost of central station plants in 1907 at $996,613,622, an increase of 97.25 per cent over 1902; electric railways, authorized capi-

tal, par value, $2,508,054,336, an increase of 64 per cent over 1902; telephone capital authorized, 1907, $1,121,931,023, a notable increase of 191.8 per cent. The street railway companies seem to have the better of the comparison in the proportion of capital outstanding to authorized, having disposed of $2,097,708,856, roughly 84 per cent of the authorized capital, while telephone companies have sold but $512,685,265, less than 50 per cent; but the public is taking up telephone securities at a rate increasing more rapidly than the absorption of electric railway stocks, as shown by the rates of increase above 1902, 59.5 for the latter, against 87.1 for the telephone. The reason for this becomes at once apparent on comparison of the dividends—electric railways paying, in 1907, a total of but $53,589,399, averaging only 2½ per cent; while telephone companies, with a quarter as much capital outstanding, paid nearly half as much in dividends—i. e., $23,733,670, an average of nearly 4½ per cent.

The reason why 4½ per cent is a particularly good showing for the telephone industry as compared with any investment whatever, is that this average has been reduced by the poor showing of a few extremely large companies which have been conspicuously unsuccessful; by the returns from a number of companies of small or moderate size, which issued stock as a bonus with bonds, and have not paid dividends on it; and chiefly by what has been a common practice with some hundreds of successful companies—namely, the reinvestment of all earnings to provide for the expansion so insistently demanded by the public. That this latter practice, although perhaps based on a financial policy which is unsound in that it hinders obtaining money from the public to finance the very growth which seems to compel the policy's adoption, has been to the ultimate advantage of investors is clear from a comparison of the amounts of bonds issued against telephone and electric railway properties, respectively. The authorized bonds of electric railway companies in 1907 were $2,319,220,837, more than 92 per cent of the authorized capital; bonds outstanding $1,677,063,240, about 81 per cent of the outstanding capital. The superior condition of the telephone business, with $556,537,932 bonds authorized amounting to almost exactly half the authorized capital, and bonds outstanding for $301,930,739, less than 60 per cent of the outstanding capital—this superiority is evident to the most casual observer. Add to this statement the evidence supporting common information regarding the extent of the practice of turning profits back into plant extensions, afforded by the report of $819,667,008 total cost of telephone construction, much of which represents real estate, buildings, and other material of high present value, we have ample warrant for a good opinion of the security, as well as the earning power of an investment in telephone property.

Boosting Collections.

Many telephone companies, in years past, have coddled their subscribers—and paid a price for the privilege of indulging their affections. In competitive territory, perhaps each manager has been afraid his rival would see a telephone coming back to the office in the wagon when none was carried away, and advertise the takeout—so the subscribers have done the advertising, and in their casual conversations with one another have given both companies reputations as easy creditors—and again the companies have paid. Various are the reasons which have led organizations to seek, at one time or another, a "great station gain;" and few are the managers who, in their carrying out of the campaign for new installations, have been so watchful as to keep the proportion of "slow pay" telephone users down to a figure that would indicate the exercise of that amount of foresight which the stockholders have a right to expect of the business man to whom they entrust their property.

It took the troublesome period of early 1908, when the breath was knocked out of all business, to set us to figuring on getting in the money. Then it was that managers began to stop making drives for new stations, which would hasten forward the date when it would be necessary to consider heavy purchases of cable and switchboards, and figure on getting all the revenue they could from the equipment they had. We know that good work was done in hundreds of exchanges. We should like to be able to give the results of all the campaigns that were waged in this one field of collection. But, just to show what can be done,—we know it can, because it is a record of facts accomplished, not a theory for the future—we publish Mr. Blomeyer's article. Look at the chart on the opposite page; that tells the story.

About Specifications.

Three kinds of specifications are all that Mr. Levings mentions in his article, printed on other pages, and of these three kinds he tells us that two are bad. He is right enough about that—but while the ink was flowing he might have stayed with us just a minute longer, and told us yet a little more vigorously that the trouble with most of us is that we haven't any specifications at all.

Take, for example, methods of doing work. We send a green man out as a helper for a little while, and when there is a rush of work put him on a few jobs alone, and perhaps don't inspect the work after he has finished it. Then trouble comes; the man is spoken to severely; says "How would he know it wasn't right?" Surely enough, how should he? Probably he met a new condition and solved his problem himself as best he could. Perhaps he thought he knew more than his foreman and believed he would "make a hit" with the manager.

It is a mighty bad thing to have too many specifications, or any at all of the wrong kind; but if we had specifications concerning the work that is not done under close supervision of experts who are permanent members of the staff; also materials subject to dangerous variations in form or quality, then the use of specifications will save many times their cost. Nowadays no company is so small that it can forego this advantage, and formal and informal organizations make it possible to procure information concerning standards, and agree upon their adoption with a minimum of expense and trouble.

The "No Pay—No Service" Plan

By E. C. Blomeyer

This is the story of a telephone company's success with the 'no pay—no service" way of handling subscribers' accounts. It ought to be of interest to every telephone man, because it pertains to a department of his business as vital as any part there is—the bringing in the money. As essential to the success of the company as the giving of the service is the collecting of the bills, for, while it is true that the bills could not be collected unless the service was given, it is also evident that the service could not be given long without collections—unless the company was a philanthropic institution, and the writer has yet to meet a telephone company of that kind.

The company referred to in this article operates a system of nineteen small exchanges with some three thousand subscribers, in a middle western state. Since the organization of the business, some four years ago, the company has had—until lately—the same trouble that besets nine out of ten small telephone companies, in making prompt collections of its service bills. Although by prompt action and constant watchfulness, no great loss had been had in bad accounts, there was outstanding from month to month, the year around, an amount close to fifteen hundred dollars—quite an item when the total amount to be collected each month did not average more than from five to seven thousand dollars. The company was not only losing the interest on this money uncollected, but the very fact that the bills owed by some subscribers were piling up and getting larger every month led not only to a loss of that subscriber's future business when the telephone was finally removed for non-payment, but often to a loss of part and sometimes all of a large bill, or entailed an exorbitant collecting expense—for any telephone man knows that collecting a telephone bill after the telephone has been removed is almost as hard as collecting for ice after the ice has melted.

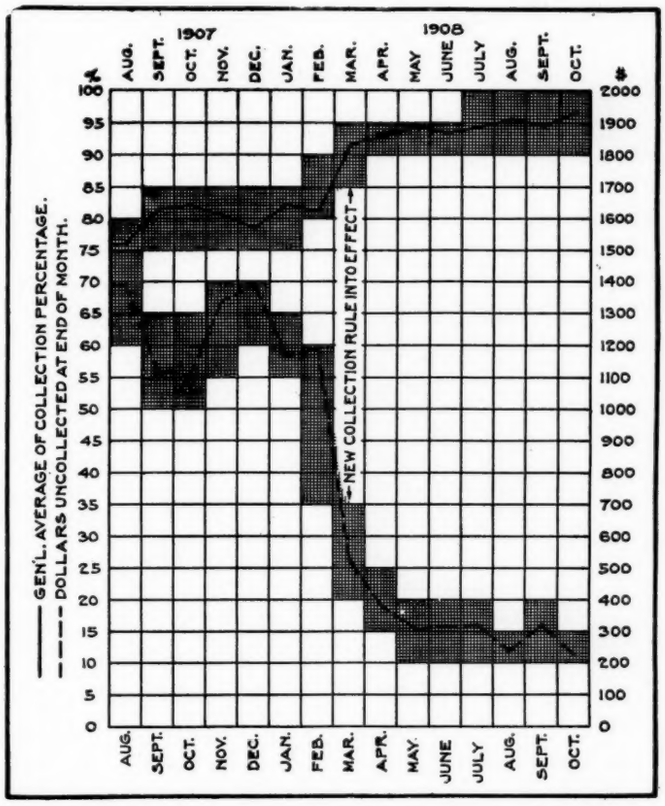


Fig. 1. Chart Showing Effect of No Pay-No Service Plan on Collections.

Various methods were tried time after time for the improvement of collections. A monthly "Collection Bulletin" was issued to all offices, showing the amounts each had to collect, the balance outstanding at the end of each month, and the percentage of the collections at each exchange to the entire amount to be collected there. This helped some, and aroused the interest of the collectors—creating a friendly rivalry amongst the different offices—but the interest soon lagged, and things became as bad as they were at first. Then a monthly collection premium plan was inaugurated, by which the collector making the highest percentage for the month was given a prize of five dollars, and the collector making the next highest percentage was paid two dollars. This was better; gradually the general percentage of collections each month crept up to as high as eighty and eighty-two per cent, leaving from eleven to thirteen hundred dollars uncollected at the end of each month—and there it stuck. It was plainly apparent that the right idea had not yet been found.

Up to that time there had been no general rules as to when a subscriber's telephone was to be disconnected or removed for non-payment of his bills. It depended, mostly, upon how good a friend he was to the local manager. If the manager had a grudge against him, the subscriber had to pay pretty promptly or lose his telephone; if he was a "good fellow" he could sometimes run along four or five months without paying his bill. The fact that the accounts were scattered over nineteen different towns made it hard to supervise these matters from the general office, where the local conditions governing each case could not be known. Much time was taken up with correspondence between the main office and the different exchange managers, regarding delinquent accounts, and half a dozen different forms and blanks were used at the main office for "punching up" those subscribers who were in arrears; but it usually turned out that when the main office did go after a subscriber it went after the wrong one, or went after the right one in the wrong way.

Finally the management of the company came to be of the opinion that they had been working from the wrong end all the time—that all the enthusiasm in the world amongst the collectors could not make a man pay his bill if he did not want to, and knew that, without paying it then, he would continue to receive the service, and could pay the bill when he got ready. It was decided that the people to "work on" were the subscribers, not the collectors. So, after some deliberation over the matter, the following circular letter was printed, and a copy was mailed to every subscriber to the company's service on the nineteenth day of February, 1908:

"NOTICE TO TELEPHONE SUBSCRIBERS."

"On account of the trouble which we have had in the past in collecting our bills for telephone service from some of our subscribers, we are compelled to put into effect the following rule:

" 'Beginning March 1, 1908, and thereafter, all bills for telephone service must be paid by the twentieth (20th) of the month in which the bill becomes due. If not paid by that date, the telephone will be temporarily disconnected at the central office. If the bill is not paid by the first day of the following month, the telephone will be removed.'

"Our bills are due and payable at our local office. We shall make the same effort to present and collect the same in the future that we have made in the past, but it is understood that our failure to find a subscriber to present his or her bill shall

not act as a waiver of this rule, which will be followed in all cases, and without discrimination, when the bill is not paid before six o'clock p. m. on the twentieth day of the month.

"We regret the necessity which compels us to make this rule,

SOUTHEAST MISSOURI TELEPHONE CO.

Charleston, Mo., November 15th, 190 8.

Mr. John W. Collins,

City

Your bill for telephone service, attached, and due the first day of this month, is still unpaid. If not paid by the 20th of this month, at 6 p. m., we shall be compelled by the rules of this company to disconnect your telephone at the central office. If not paid by the first of next month, we shall have to remove the telephone.

Please call and settle, or mail your check.

SOUTHEAST MISSOURI TELEPHONE COMPANY.

11-15-190 8 Account No. 365 Remarks: See 116 of Nov. 11th.

To Collins

Amount $ 2.35

Fig. 2. Reminder Sent to Delinquent Subscribers.

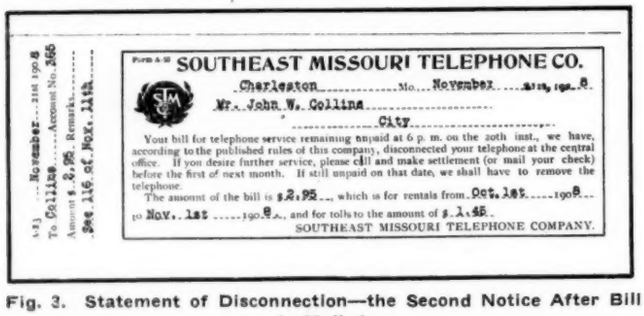
but we have found that there are certain of our subscribers who will take advantage of any leniency in our collecting and, after allowing their bills to become several months old, will have their telephones removed and cause us a loss of all or a part of their account. In many other cases, where the bill is paid each month, we have to present it from two to ten times before we can get our money. It sometimes costs us, in time and labor, half as much to collect a bill as the amount we receive.

"We cannot see where this rule will work any hardship on anyone who subscribes to our service in good faith. Those who pay their bills promptly will not be hindered by our action in this matter. This letter should not be construed by any one receiving it to mean that he or she has not made prompt payment of our bills, because a copy of the same is mailed to every subscriber to our service.

"Our managers are instructed to follow this rule strictly, and without discrimination, and it is understood by them that their failure to do so is equivalent to their resignation from the service of this company.

"Please note that on March 20, 1908, and on the 20th of each month thereafter, all telephones will be disconnected for which the bills have not been paid."

The fact that it was necessary to send the notice to all subscribers, no matter whether they had ever been delinquent or not, caused some trouble right at the start. Some five or six telephones were ordered out by offended subscribers and, the company received a number of letters protesting at the "discourtesy." To all these a courteous reply, explaining the situation, was sent, and after a better understanding of the matter



SOUTHEAST MISSOURI TELEPHONE CO.

Charleston, Mo., November 21st, 190 8.

Mr. John W. Collins

City

Your bill for telephone service remaining unpaid at 6 p. m. on the 20th inst., we have, according to the published rules of this company, disconnected your telephone at the central office. If you desire further service, please call and make settlement (or mail your check) before the first of next month. If still unpaid on that date, we shall have to remove the telephone.

The amount of the bill is $ 2.95, which is for rentals from Oct. 1st, 1908 to Nov. 1st, 1908, and for tolls to the amount of $ 1.45.

SOUTHEAST MISSOURI TELEPHONE COMPANY.

11-21-190 8 Account No. 365 Remarks: See 116 of Nov. 11th.

To Collins

Amount $ 2.95

Fig. 3. Statement of Disconnection—the Second Notice After Bill is Mailed.

was established, those subscribers who had made the protest soon cooled down. Later, it is worth mentioning, all but one of the parties who had had their telephones removed had the instruments re-installed.

For the benefit of a number of subscribers, considered good, but who were from ten to twenty dollars or more in arrears, an "Installment Agreement" was offered, by which the subscriber agreed to pay the old account in five equal installments one month apart, and to keep his current account paid up each month. This agreement was signed by twenty-six subscribers, and all but one of these made their installment payments promptly and as agreed until the old account had been wiped out.

Naturally, it was with some anxiety that the result of the first disconnection day was awaited. A glance at the chart tells the results fairly well. After all the reports were in it was found that there had been disconnected fifty-seven telephones. Of these subscribers, forty-five paid up and were reinstated—a net loss of twelve. It should be remembered, however, that the subscribers actually lost were those of the most undesirable class—the kind who were continually putting off the collectors, and were hard to get money from; the company figured that it was better off without this kind of subscribers than with them, anyway. The average collection per-

Form T-6. Use Two Sheets If Necessary.

SOUTHEAST MISSOURI TELEPHONE CO.

REPORT OF DISCONNECTIONS.

Charleston, Mo., Exchange, Nov. 21, 190 8

AUDITOR:

According to the rules of the company, I have disconnected or discontinued from service the following telephones at this exchange, at 6 p. m. on the 20th inst. Those marked "D" are disconnected; those marked "O. S." have had their service discontinued.

	NAME	Tel. No.	Acc't No.	Res. Bus. or Farm	Dis. or O. S.	Was Bill Presented Personally?	If not, why not? Tell briefly why subscriber did not pay.
1	Jno. W. Collins	35	365	Res	D	Yes	See 116 of 11-11-1908
2	Arthur Smith	B-2	116	Farm	OS	No	Bills mailed; did not settle.
3	Leon Gregory	16	56	Res	D	Yes	Claimed was "broke".
4							
30							

FILL IN BLANKS ON BACK OF REPORT. READ INSTRUCTIONS CAREFULLY.

I certify that this report is correct in all particulars, and agree to be liable for any rentals accruing on any of the above telephones after the 20th inst. if, contrary to this report, the same are still in service.

I understand that all the above telephones on which the bill has not been paid by the first of next month, are to be removed and reported regularly on form T-6.

W. W. Williams Manager.

We certify that we have carefully read this report, and that a copy of the same is now posted on our switchboard, and that we understand that none of the above subscribers are to have service unless reinstated according to the regular rules of the company.

Mary Anderson Operator. Tessie Johnson Operator.

Anna Williams Operator. Operator.

Fig. 4. Report Form, Sent to Manager from Headquarters when a Telephone is Taken Out.

centage had jumped from 81 per cent to almost 92 per cent; the uncollected bills had fallen from twelve hundred dollars to five hundred and twenty-five, and this amount would have been even smaller had it not been for the balances due on the installment accounts, mentioned in a previous paragraph.

The result of the following eight months of the plan are shown by the chart. The last percentage of collections figured, for October, 1908, was over ninety-six; at the time this is written the November figures are not available, but the indications, from the reports already in, are that the percentage will be more than ninety-seven, and the outstanding bills less than two hundred dollars. This outstanding, it should be said, included not only balances due on telephone disconnected, but also balances due the company for telephones previously removed and upon which the bills have not yet been paid.

The rule governing the disconnection of telephones at six o'clock p. m. on the twentieth of each month is handled without favor to anyone, with two exceptions—telephones for fraternal societies, and for city or county institutions, where the bills have to be passed upon by quarterly meetings of manag-

ing boards, are not disconnected, but are allowed to run three months. Otherwise, there is no discrimination. The company has disconnected the telephones of some of the most prominent men in the towns in which it operates—of the mayors, in some instances—and of men who were able to pay the bill a hundred times and never miss the money, but who failed to pay it by the twentieth. No one is a good enough friend of any employee or official of the company to retain his service after the twentieth of the month unless his bill is paid. Absolute indiscrimination is of course necessary for the success of the plan, and the rule is carried out to the letter. Experience has shown that when once a good subscriber's telephone had been disconnected and then reinstated, there is no more trouble in collecting from him—he remembers the rule after that, and is always ready with his money.

Subscribers whose bills are in arrears are divided into two classes—those disconnected, and those discontinued. The former are single line town subscribers, whose instruments are cut out by placing a red plug in the switchboard jack; the latter are farm or party line subscribers, who, after the twentieth, are refused service to the exchange. Promptly on the twenty-first of the month each exchange sends in to the main office a "Report of Disconnections," showing all instruments disconnected or discontinued at that office, and this report is not only signed both in original and duplicate by the exchange manager and all his operators, but a copy of it must be posted on or near the exchange switchboard, and kept there until the first day of the following month, when all telephones not then paid for are removed.

This article would hardly be complete without a brief outline of the collecting system used. Under the title "A Self-Auditing Collection System," in the *American Telephone Journal*, issue of March 21st 1908, the writer described the billing system used by this company. The plan, briefly, is this: the statements for all the exchanges are made out each month at the main office, and are sent to the exchange, bound in book form, on the last day of the month. Each statement has a stub, and with the book there goes an itemized list of all the statements sent, which the collector receipts and returns. No duplicate statements are furnished, and no blank ones. A statement is never given out by a collector unless the bill is paid in full; if the subscriber pays only a part, a "Partial Payment Receipt" is given him, and the original statement retained. When the collector mails out bills he uses a "Duplicate Bill," and does not send the original statement. On a certain day near the end of each month the collector is required to return to the main office all his uncollected bills, for which he is given credit; he is expected to turn in the money for all the others.

The system is in itself a guarantee that the company will receive from the collector all the money that has been paid to him on accounts. If he returns the bill as uncollected, the "Report of Disconnections" must show that the telephone was disconnected or discontinued. Before the statements are sent out all the subscriber's accounts are checked up at the main office, and the returned statements and "Report of Disconnections" compared with the accounts which are still unpaid. If an account shows as unpaid, and the statement has not been returned or the telephone disconnected, the amount due from that subscriber is entered on the collector's last cash report, credited to the subscriber, and the collector is notified to send in the money.

Immediately after receiving his statement book from the main office, the collector sends a duplicate bill to each of his rural subscribers, and also one to any of his town subscribers who may be in the habit of paying their bills by mail. With

SOUTHEAST MISSOURI TELEPHONE COMPANY.

Form A-21 AUDITING DEPARTMENT

CHARLESTON, MO., Dec. 1st 190 8

MANAGER Charleston, Mo.

Our records show that Jno. W. Collins, *who was a former subscriber at your exchange, telephone No.* 85, *Account No.* 365 *and whose telephone was removed* 11-20-1908 190—, *owes a balance of* $3.85 (Rent 10/1 to 11/20 & Tolls)

Please let me have the following information regarding this person, on this blank, and as soon as possible. Answer ALL questions.

E. C. BLOMEYER, Auditor.

Do you know of any reason why this account is not correct? No. *If so, give particulars* ----------

Is the party still in your town? Yes.

If not give his (or her) present address ----------

What is his (or her) occupation? Clerks in store.

Who does the party work for? Smith & Johnson, Gen'l. Merchants.

Has he (or she) to your knowledge, any property? Yes.

Do you consider this account collectable? Or, do you think it worth while to make further attempts at collections? Please give any information possible Yes, is collectible. See my 118 of November 11th, giving full particulars in account.

All information given will be considered confidential, and your name will not be mentioned in any correspondence from this office with the subscriber.

Please sign your name: W.W.Williams *Local Manager.*

No. 76

Form 116

SOUTHEAST MISSOURI TELEPHONE CO.

Charleston MO., November 11th 1908

AUDITING DEPARTMENT:—

I desire assistance in collecting accounts of John W. Collins, Account No. 365 at this exchange, which I can not collect for the following reasons:

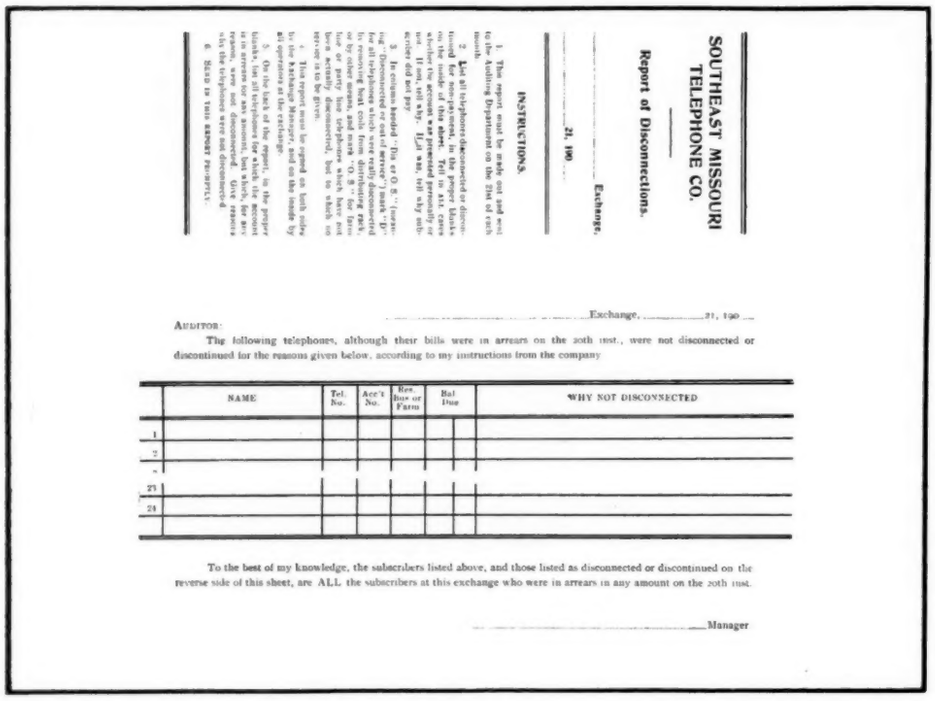
Subscriber claims that tolls amounting to $1.45 were talked from his telephone without his knowledge. Have investigated, and find that subscriber's wife o. k.'d the four msgs., which were talked by Mrs. Smith, a neighbor. Have shown subscriber copy of his contract, and he still refuses to pay. Is a man easily angered, but think if matter is explained from main office he will see it rightly.

W. W. Williams
MANAGER OR COLLECTOR.

Attach duplicate bill, and send separate slip for each Account No.

Fig. 5. Form for Collector's Report in Case of Refusal to Pay.

each of these bills is sent a copy of the toll account, a stamped and addressed return envelope, and a small notice headed "Our Collecting Experience." This reads as follows:



SOUTHEAST MISSOURI TELEPHONE CO.

Report of Disconnections.

Exchange.

21, 190

INSTRUCTIONS.

1. The report must be made out and sent to the Auditing Department on the 21st of each month.

2. List all telephones disconnected or discontinued for non-payment, in the proper blanks on the inside of this sheet. Tell in ALL cases whether the account was presented personally or mailed. If mailed, state whether or not any answer was received. If so, what was said. If answer did not pay. If no answer, tell why subscriber did not pay.

3. In column headed "Da. or O. K." (meaning "Disconnected or out of service") mark "D" for all telephones which were really disconnected by removing heat coils from distributing rack, or by disconnecting cable terminals. Mark "O. K." for any line telephone which have not been actually disconnected, but to which no service is to be given.

4. This report must be signed on both sides by the Exchange Manager, and on the inside by the Collector in charge.

5. On the back of the report, in the proper blanks, list all telephones for which the account is in arrears for any amount, but which, for any reason, were not disconnected. Give reasons why the telephones were not disconnected.

6. SEND IN THIS REPORT PROMPTLY.

AUDITOR: Exchange, 21, 190

The following telephones, although their bills were in arrears on the 20th inst., were not disconnected or discontinued for the reasons given below, according to my instructions from the company

	NAME	Tel. No.	Acc't No.	Res. Box or Farm	Bal Due		WHY NOT DISCONNECTED
1							
2							
23							
24							

To the best of my knowledge, the subscribers listed above, and those listed as disconnected or discontinued on the reverse side of this sheet, are ALL the subscribers at this exchange who were in arrears in any amount on the 20th inst.

Manager

Fig. 6. Manager's Monthly Report of Telephones Disconnected for Non-Payment.

"OUR COLLECTING EXPERIENCE"

has shown us that most people had rather have their bills mailed to them, so that they can write out and mail a check at their convenience, than to be bothered by a collector—likely at the time they are busiest.

"Accordingly, we send herewith a memorandum of your bill, and a stamped and addressed envelope. If you desire to do so, we would be glad to have you mail us your check for the amount. Our regular receipt will then be sent to you.

"Please do not understand that we make this obligatory—if you prefer to have your bill presented personally, we are perfectly willing to do so. That is, we will try to present our bills to anyone living in town—we do not, of course, agree to do so for the rural patrons.

"If you desire any further information about the bill telephone our office.

"Thanking you, we are,

"SOUTHEAST MISSOURI TELEPHONE COMPANY."

As shown by the records, about seventy per cent of these bills sent out bring a check; then the regular receipt is mailed to the subscriber. Fifteen per cent more of them will bring the subscriber to the office to settle the bill. The cost of collecting a bill by this method is about four cents for each town subscriber, and six and a half cents for the rural subscribers, as the rural free delivery requires two cent stamps both ways.

On the fifteenth of the month a notice, Fig. 2, is sent to each subscriber who has not yet paid. This notice is also accompanied by a duplicate bill, but not by a return envelope. On the twenty-first of the month a notice, Fig. 3, goes to each subscriber whose telephone has been disconnected or discontinued for non-payment.

When a telephone is removed for any reason, and the account is not paid up in full, a statement for the balance due is sent to the exchange collector for three successive months thereafter. Then, if he is unable to collect the bill, the account is carried to the "Suspense Account," and is placed in the hands of a collection agency with which the company has a yearly contract. If the former subscriber moves away from the town in which the bill was made, the account is placed with the collection agency immediately. By prompt action of this kind it is very seldom that all such bills are not collected. It has been found that the ten per cent commission charged by the collection agency for handling such accounts is more than offset by the elimination of the endless correspondence and bother of trying to collect the accounts from the general office. Of course, if the account is considered an easily collected one an attempt is made to collect it before it goes to the agency.

Whenever a telephone is reported out by an exchange, a blank, Fig. 4, is immediately sent to the manager there, calling for a report on the account. These reports, when returned with the information called for, are of great assistance in handling the collection of the account. Another blank sometimes used, Fig. 5, is sent in by the collector when for any reason, the subscriber refuses to pay his bill—this is used only when the telephone is still in service. When this report is received the matter is immediately investigated, and then taken up by correspondence with the subscriber. All disputes over current accounts are required to be settled one way or another before the twentieth of the month.

As a further protection, the company keeps a card record of every subscriber whose telephone has been removed, and from whom there is still a balance due. Before a telephone can be installed at any exchange, the application, signed by the prospective subscriber, must be approved by the general office. If the "Arrears" cards show that the applicant owes an old bill at that or any other exchange, the application is not approved until the bill is paid. Many cases arise where a subscriber at one exchange will move to another town in the company's territory, leaving a bill unpaid at the first town, and apply for a telephone at the second town; a refusal to install the instrument until the bill is paid usually brings a prompt settlement of the account.

The plan outlined here is commended to any company operating under like conditions. No company can carry on its business properly if it is handicapped by a heavy list of outstanding accounts. It will be found that a strict enforcement of the rule given here will be welcomed by the better class of subscribers; as for the other kind—well, better a vacant drop than a subscriber who will not pay his bills. At the usually low rates at which service is furnished in the smaller towns, a company cannot afford to spend a great deal in collecting its hundreds of small accounts, or to lose a great deal in bad accounts, and the sooner the patrons are educated to the fact that the telephone bill must be met as promptly as the grocery bill, or any other bill, the sooner will the company's stockholders be allowed an equitable profit on their investment. And the sooner every telephone company in the field adopts the "no pay—no service" policy, the better it will be for them all.

A New Cause of Trouble.

A subscriber called a number and was told it was busy. He called again and was given the same information. About this time the line was referred to the "hospital" on permanent signal, and when the subscriber called the third time he was told the line was out of order. The subscriber wanted to know if "they had talked it to death."—*Operating Bulletin.*

Specifications, Their Uses and Abuses

By S. D. Levings

The establishment of uniformity of materials and methods in constructing and maintaining the telephone plant is the first step toward a successful organization and economy both in first cost and in maintenance. There are a number of ways to gain this desired uniformity, such as close supervision of work and inspection of materials, adherence to time honored customs, the purchase of materials from the same supply houses, etc.; but the best known method, even if the one least used, is the specification method.

The use of specifications, properly and intelligently written, can only result in benefits, but other than good results can easily be obtained, as will be seen later, from specifications which are improperly written. The advantages gained by the use of specifications, for both methods and materials, are apparent to most of us, but to clearly set forth in a marked way these advantages, let us look at a typical case for a moment. A certain telephone company, operating approximately 165,000 telephones in a large city, has one superintendent of construction, and under him three division superintendents, each of whom in turn, has three or four working gangs operating all the time, besides a dozen or more installers. Can one imagine the different kinds of work he would meet in a day's walk, were it not for definite specifications covering all branches of the work? Can one imagine the wasted time and material there would be, if it were not for specifications? Lastly, is there a better way of obtaining uniform results than by the specification method? No. The specification way is the most efficient one at present known.

It is a well acknowledged fact that system is the making of the internal revenue of the office, factory, or telephone plant, as the case may be, and if one substitutes the word specification for system, in the case of the construction and maintenance of the telephone plant, he arrives at the cause of a great source of internal revenue. A large plant has been selected to illustrate the advantages gained by the use of specifications, or to speak in the negative, the disadvantages that would result from the absence of them, but the same advantages and disadvantages exist in the smaller plant, and are even more apparent in the case of the disadvantages. In the telephone business there always exists a proportion between the large plant and the small plant, both in expenditures and profits, and, as a consequence, what is beneficial or detrimental to the large plant is, in its proportion, so of the small plant. The marked deficiency of specifications in the small plant is said to be due to the lack of an engineering force. It does not appear, when the true nature of things is known, that this premise can be granted in argument. It is certainly true that specifications cannot be prepared with the same degree of accuracy and efficiency without the aid of engineering advice, as they can with it, but it is just as true that for the ordinary material and construction methods, a carefully thought out and compiled specification by a man of ordinary experience will guarantee more uniformity than none at all.

The making of a specification consists in putting on paper the things that one does, or does not want a thing or a method to be. It would seem, then, that the man who builds or maintains a plant must know what he requires, and if so should be able to put his requirements on paper for the enlightenment of others.

Specifications are usually of three kinds. First, indefimite; second, too definite; and a third variety half way between the first two. These might well be defined under the heads of nonsensical, irrational, and rational.

Let us take up for discussion the proper method to be followed in writing specifications, and in doing so, take examples from the three sub-heads into which we have divided the different types of specifications. The first class, that of the indefinite specification, is probably the one most met with in the abuses of specifications. A specification is primarily compiled for the purpose of obtaining a standard. It is impossible to conceive of an indefinite specification meeting this requirement. An indefinite specification many times will cause added expense, because it does not bring the article in question up to the standard that is required in working practice As an example of the indefinite specification. consider one calling for some article of construction material, consisting of iron, and which is desired to be furnished galvanized. The particular specification which called forth this comparison could not be criticized until the question of galvanizing presented itself. The writer of it, in all probability, took it for granted that galvanizing was so common that no definite instructions or requirements concerning the galzanizing were needed, so the specification simply called for the article, to be "galvanized." Now to show how indefinite this particular clause was, let us look to the question of galvanizing as it really should be specified, and the possible results of this indefinite manner of requiring it. There are two accepted methods of applying the spelter in galvanizing, one the so-called "cold dip," or electrolytic method, which is only fit for galvanizing articles not subjected to atmospheric conditions, and the other the "hot dip", or immersion method, which should always be used for articles to be placed out-of-doors. From this it is very evident that to simply specify "galvanized," does not establish what is really wanted, nor does it guarantee the galvanizing required. Furthermore, it is not sufficient to specify that galvanizing shall be done by the "hot dip" process. Why? Because several results can be obtained in galvanizing by this method which would not be satisfactory for the purpose required. In other words, the thickness of the spelter should be limited in some way, to insure the galvanizing wanted. To do this, a test is stipulated for the galvanizing, and the galvanizing done must conform to the test to be acceptable. The test consists in immersing the galvanized article four times, for a period of one minute each, in a saturated solution of copper sulphate, upon the conclusion of which test the article shall not show signs of discoloration. This has been found a sufficient test to guarantee a thickness and quality of spelter to meet the requirements for outside work. So, considering the actual state of affairs, specifying simply "galvanized," affords a great lee-way in the method of applying the spelter, which may result in the article being of little or no value.

The question now is, what are the results of an indefinite specification? To illustrate this, take the above case which will serve as a good example. A specification is sent out to several manufacturers, calling for an article which shall be "galvanized." Bids are received, and one among the number happens to be considerably lower than the rest. The firm is investigated, found to be reliable, and the order is placed with it. The articles

arrive, are installed, and in the course of a year or two an inspection brings out the fact that they are discolored, and rapidly deteriorating, due to the action of the elements, producing rust. Correspondence is immediately opened with the manufacturer, or he is personally visited, informed of the state of affairs, and asked to replace the articles in question. The manufacturer turns to his file, produces the specification, reads it, and says he is very sorry, but that he cannot do anything in the matter, as he manufactured the articles in accordance with the specification. He is told of the uses to which the article was put, and replies that the specification did not mention any uses, and not being familiar with the practice of every company operating, he could assume nothing in this regard. He further advises that he made an especially low price on the article, because it was not as strict in the galvanizing requirements as most specifications are, and as a result of the indefinite clause on galvanizing, did not take special pains to do a heavy job. The telephone company manager swallows hard, goes home, prepares a new specification, and buys a new lot of these articles, this time under a revised specification. But the money is gone with the displaced material. The manufacturer was right. He will not assume anything if he is furnished a specification. There are numerous other deleterious effects growing out of the writing of indefinite specifications, too numerous to mention here.

The "too definite" specification is perhaps, from the standpoint of its aid in obtaining a high-grade article, to be preferred to the indefinite specification, but on the other hand it is more liable to increase expenditures. A "too definite" specification is one that calls for requirements which will necessitate a change in manufacturing methods, or one that will refine the requirements beyond accepted practice. This forced alteration is the source of additional cost which is a needless expenditure.

One of the most flagrant cases of the "too definite" specification which has come to the writer's notice, was one for cast iron manhole frames and covers. The company issuing this specification was determined, it seemed, to assure itself of a good quality of iron in the frames and covers, which would withstand the wear and tear which they are subjected to, and judging from its specification, it would have gotten what it wanted and a little more, which of course would have been needless. Under the heading of "Quality," this specification went on to tabulate the maximum and minimum limits of carbon, sulphur, manganese, silicon, phosphorus and copper to be contained in the iron. The specification was sent out, and in the due course of time bids were received, all of which were higher than any previous price paid. An investigation was immediately started on the telephone company's part, to determine the cause of the marked advance in the cost of iron castings over former prices. The replies which were received from the manufacturers were all about alike, and stated that the clause on quality being so specifically defined, they would be forced to engage a chemist to make tests on each heat from which the frames and covers were cast. The manufacturers all pointed out that the clause on breaking strengths which this same specification contained would assure the telephone company a quality of iron which would meet the requirements for which it was intended, and the telephone company, taking the hint, immediately withdrew the specification, cut out the "too definite" portion, and re-issued it, with the result that it got a good quality of iron, and at the old price. Another case of note was a specification for pipe hooks, used in securing lateral risers to poles. This type of hook was made from wrought iron, forged, and then galvanized. The telephone company obtained a sample of one of the hooks, had its draftsman make a dimension drawing, wrote a specification, included the drawing, and issued it. It received the hooks, and they looked as if they had been machined. The price looked as if they had, too. On inquiring into the price, it was found that the manufacturer had judged from the drawing accompanying the specification, that the telephone company wanted a more finished article than it was usual to furnish, and had done its work accordingly. Now the drawing was all right, and the specification was, also, but for one thing. If a clause had been inserted stating that slight variations would be allowed from the dimensions shown on the drawing, the article would have come in form similar to the one the draftsman had made his drawing from, and at a considerably lower figure. From the above cases it will be seen that disastrous results can be obtained from the use of the "too definite" specification.

The last class of specification, the rational one, is one that defines all of the requirements of the article to be furnished, in such a way that it will impose no unfair conditions on the manufacturer, but will, at the same time, guarantee an article of the dimensions and finish wanted. The great factor in drawing up rational specifications is good judgment, combined with a knowledge of the subject matter in hand. At this day and age, with all the literature there is available, it would seem that specifications could be compiled which would not be conflicting, nor illusive. Specifications for trade or market articles require a great deal of thought, so expended as to build up a specification that will enable all manufacturers to compete, and which will not contain any clause that will force special manufacture on the part of one or all of the manufacturers. Such specifications as those for terminals, wire, cable, etc., come under this class. Specifications for proprietary articles can be made with great detail if desired, as the articles can be obtained from but one source. And a word might be said here concerning proprietary articles. There is possibly more danger in getting poor products under this class of article than any other, because certain manufacturers realize that people must come to them for the goods, and will take advantage, if advantage can be taken. This does not mean that manufacturers are in the habit of doing business along these lines, but it is reasonable to assume that if all products were up to sample, there would be no need of specifications, except for special articles, made from the telephone company's drawings.

In conclusion, if you would have a uniform plant, constructed of uniform materials, get the specification habit. If you are not capable, secure the services of a capable engineer. If you can draw up your own specifications, do not generalize where you require detail, and do not refine your requirements to the nth. power, where they will be amply sufficient in the root.

A New One for the Engineer.

In a recent issue of the Kansas *Farmers' Mail* appears the following:

"A reader at Russell, Kan., has asked how others have solved the Farmers Mutual telephone problem. I shall endeavor to give him the benefit of five years' experience.

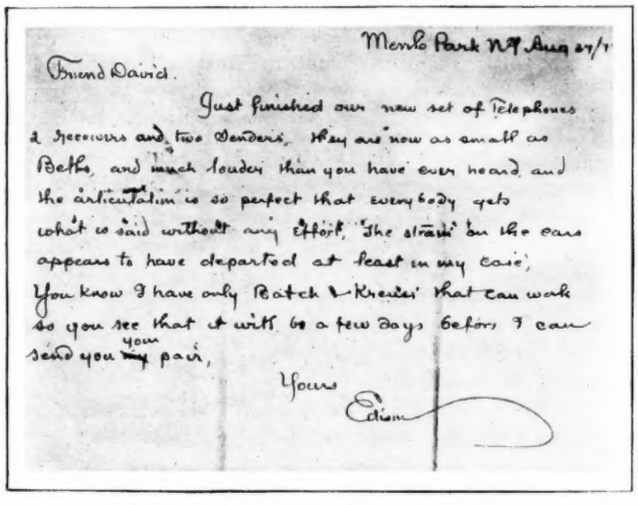
"Organize local companies in all the territory surrounding the town in which you expect to locate your central. The companies thus formed constitute what is termed 'loaded' lines and may be successfully operated with ten telephones on a line."

Apparently the contributor had been reading the technical journals, and thought the term correctly used to designate lines equipped with Pupin coils was a good one to work off on his rural neighbors not posted in the telephone business.

Notes on Early Telephony

In a valuable paper presented at a meeting of the Engineers' Society of Western Pennsylvania, Mr. Sergius P. Grace, general superintendent of plant for the Central District and Printing Telegraph Company, set forth a number of interesting facts of early telephone history which are not generally known, and traced the development of technical branches up to the present time. Following is an abstract of leading points in the paper:

"When in the memorable year of 1875, Alexander Graham Bell gave to the waiting world the masterpiece invention of the century, the electric telephone, there were many who considered it only a scientific toy; but the discerning ones saw that properly developed it was going to be the greatest labor saving invention of the ages. Among the latter was T. B. A. David, the president of the Central District and Printing Telegraph Company. In the fall of 1876 he investigated the electric telephone system of Bell, and shortly afterwards he witnessed a trial of a Bell telephone receiver in combination with the recently invented carbon transmitter of Thomas A. Edison. Mr. David, with his broad mind, instantly saw the possibilities of the telephone and determined that Pittsburg should be one of the first cities in the country to exploit this invention. Having control of the lines of the Central District and Printing Telegraph Company he was in a good position to introduce the telephone. In the summer of 1877 Thomas A. Edison agreed to make for Mr. David two telephones for exhibition purposes in Pittsburg. There were delays in the manufacture of these instruments because of the limited machinery and material at Mr. Edison's disposal, and several letters were written by Mr. Edison to Mr. David explaining the delay and asking him to keep up his courage. These letters were recently taken from an old file of the Central District and Printing Telegraph Company, and they throw an interesting side light on the development of telephony in the days when the carbon transmitter was being born. Mr. Edison has always had the reputation of being a hard worker, and this is borne out by his statement in one of the letters that he and his assistants were working 22



Menlo Park N.J. Aug 27/1

Friend David.

Just finished our new set of Telephones 2 receivers and two Senders. They are now as small as Bells and much louder than you have ever heard and the articulation is so perfect that everybody gets what is said without any effort. The strain on the ears appears to have departed at least in my case. You know I have only Batch & Kruesi that can work so you see that it will be a few days before I can send you your pair.

Yours

Edison

Fig. 1. Letter Written by Edison While Working on His First Telephones, in 1877.

hours per day. In another letter he asks Mr. David not to be too critical regarding the first two telephones, for he had to make them with some old pieces of hard rubber and a pair of pliers. One of these letters is reproduced in Fig. 1.

"From 1876 to 1886 the telephone all over the country had a struggle for existence. The telephones were of the crudest type, the switchboards were simply adaptations of telegraph boards, and the vast amount of iron wire strung on roof tops was a combination not productive of a telephone service such as would inspire the confidence of the public. Added to these handicaps the introduction of the electric trolley and electric light and power service made the grounded telephone lines extremely noisy by induction. As an example of the crude switchboards of early days a switchboard is shown in Fig. 2 which was made by Charles Williams in his old Boston shop in the early 80's. This board was used for a number of years for a private branch exchange in the Dixmont Insane Asylum.

"It was early found that iron wire, because of its high resistance and inductance, seriously retarded telephone speech, but copper wire could not be used because of its low tensile strength. It was not until Thomas B. Doolittle, of the engineering staff of the American Bell Telephone Company, developed the process of hard drawing copper wire that copper could be used at all for outside lines in the development of telegraphy and telephony.

"Even with the advent of metallic circuits many troubles were experienced with the telephone lines from external induction from electric light and power wires, making the telephone lines noisy, and from induction caused by neighboring telephone circuits, resulting in the phenomenon called 'cross talk.' A system of transpositions had to be developed which would keep the lines reasonably free from induction from outside sources and yet which would prevent 'cross talk' from one telephone circuit to another. 'Cross talk' is overhearing from one circuit to another, the current being induced electromagnetically and electrostatically without metallic contact.

"Because of the large number of wires required in telephony it became imperative to design a cable which would accommodate in a small space many hundreds of wires. After a long period of development work Mr. Patterson of the Western Electric Company finally developed his paper-insulated, lead-covered telephone cable, which still remains the standard of the telephone world."

"In the last eight years there has been great development in the methods of outside construction. In the early days telephone lines were naturally modeled after the existing telegraph construction. The large number of circuits required and the different character of the transmitted current has led to special types of construction for telephone work. In the large cities, in congested centers, underground construction is employed, using cables containing as many as 600 pairs of wires, with direct connection to the subscribers' premises by means of interior block wiring. Conduits are also built along the main feeder routes to the outside districts, but the distribution is effected at right angles to these feeder routes by neatly designed aerial cables. These cables contain from 50 to 200 pairs of wires and are tapped about every other pole, so that the service wire to the subscriber's premises may be made of a minimum length. It is interesting to note that one of the first underground systems for the distribution of telephone wires anywhere in the world was installed in 1882 on Fifth avenue, between Wood street and Liberty avenue, Pittsburg. Perforated porcelain blocks were laid on edge in a wooden box and annunciator wire pulled through the holes, after which the box was filled with pitch. These wires gave service for nearly a year, until the insulation finally failed.

"It had been known for some time that even with very powerful transmitters the range of telephone transmission had a distinct limit, and the increasing of the transmitting power had but little effect in increasing the volume or improving the articulation of the transmitted speech. The telephone current has such a high frequency that the distributed capacity in a

long telephone line is very active in attenuating and distorting telephone speech. Remembering that the telephone current alternates from 100 to 2,000 times per second, the difficulty of obtaining a sufficient quantity of electricity at the far end of a long circuit to properly operate the receiving telephone apparatus can easily be appreciated. If we had to deal with the resistance of a telephone circuit alone, and the capacity and self-induction were absent, the current received at the far end would be strictly proportional to the resistance of the circuit; but when distributed capacity is combined with resistance and the self-inductance is very small, the waves of current are rapidly attenuated and besides distorted, for the higher frequencies, corresponding to the over-tones of the human voice, will not be attenuated at the same rate as the lower frequencies, and therefore the received speech will appear unintelligible or distorted to the listener.

Fig. 2. One of the Earliest Telephone Switchboards, Made by Charles Williams.

"Mathematical electricity had pointed out some years ago that the distributed capacity of a telephone circuit might be counteracted by inductance placed in the circuit, but it remained for Doctor Pupin, of Columbia University, to show us how to place self-inductance in a telephone circuit so as to limit the effect of the distributed capacity. These self-inductance coils are known as loading coils and are being used today in thousands of lines of the Bell telephone companies. The placing of these coils in a telephone circuit will increase the range of good telephone transmission over the circuit from three to five times. This invention has been of the greatest importance to telephony and its value cannot be overestimated.

"The telephone repeater is another recent invention which gives great promise and in conjunction with loaded lines may increase the range of transmission of a circuit many times. A few of these repeaters are now in commercial operation."

In the discussion of this paper, Mr. H. W. Fisher said: "After the reading of this excellent paper, one is filled with astonishment at the extent to which engineering is being introduced into telephone work. I can go back to the year 1891 or 1892 when Mr. Metzgar, the general manager of Mr. Grace's company, asked me to call at his office, saying there was a fault in a telephone cable which he did not think could be located. Several people had tried to locate faults for them and had not been very successful. They had no one in particular to locate faults at that time, and those that had been located were by people who had come from the Western Electric Company. I made measurements and located the fault over in Allegheny under a car track, and it was found only a few feet from where the measurements indicated it to be. This was simply a question of mathematics, and I bring it to your attention to show the great development that has taken place.

"The fine work which has been done by the telephone company has caused persons in other lines supplying apparatus to the company, to scratch their heads trying to accomplish unusually difficult things. It was only a few years ago that Mr. Grace came to the Standard Underground Cable Company and said they wanted a cable in which the unbalance of capacity between two adjacent pairs would not be more than 1/100,000 of a micro-farad. We had to do a lot of experimenting before finally making a cable that would meet these requirements. This cable was required for use in connection with the Pupin coils mentioned by Mr. Grace. Not only the local company but other telephone companies have had to struggle with difficult engineering problems in order to get long distance transmission over the country."

Mr. E. B. Tuttle spoke as follows: "That the end of developments in telephony is not yet becomes more apparent to the telephone engineer every day. When Prof. Pupin worked out a satisfactory practical loading scheme, it was found that reflection losses between loaded and non-loaded lines was very considerable, and a very expensive and complicated terminal tapering or gradual reduction of the loading at the ends was made use of to reduce the reflection loss. This was found very satisfactory from the operating standpoint, but was found too expensive for general use. Within the last year a specially designed transformer has been found to do this work and the work of repeating coil also, thus accomplishing the same saving from reflection losses with but very slight additional cost."

A Telephonic Error.

Rev. Hugo Tell, a quick, irascible priest of a Western town, had occasion to use the "long distance" one day, and through some mistake "Central" was not as polite as she should have been. The reverend gentleman felt it his duty to call up the inspector and accordingly did so.

"Who is this?" inquired the inspector.

"Hugo Tell," snappishly came the answer.

"What did you say?" asked the inspector.

"Hugo Tell," bawled the father, growing red in the face.

"Look here, sir," came the reply of the inspector, "this is not the place to get funny, and I want you to understand that no profanity is allowed on this line."

And then the line was hot with explanations.—*Short Stories.*

"Eastern Slurs."

Under the above heading the Pacific Telephone Magazine reproduces the following:

"Fleas are such a pest at many points on the Pacific Coast as to make life miserable for the population. The traffic department of the Pacific Coast Telephone Company is said to be making a study as to whether an operator who receives a telephone call and a flea bite at the same time shall give the call or the flea bite first attention."—*Wisconsin Telephone News.*

When the Transmitter "Went Dead."

One of our students walked up to the chief operator and reported for duty one morning recently, with her set in her hands, and said, "Miss ————told me that my set died last night, and I want to know if I can have it exchanged."—*Operating Bulletin.*

Telephone Geography.

Mr. W. S. Vivian, secretary of the Michigan Traffic Association, in an address at the last meeting of the Michigan Managers' Association, gave some valuable hints for the betterment of long distance work by the careful study of routing. Speaking on the topic "Telephone Geography," he said:

"Those engaged in the handling of long-distance business should not only know the general geography of the state, but should know, in a general way, how the various parts of the state are connected with toll lines.

"I think that all managers and long-distance operators should be so well posted that they will not have to refer to a map to locate a town fifty or one hundred miles away but that they would instantly have a picture of the road in their minds when the place was mentioned. Not only the location, but also the towns the lead goes through to get there, and the kind of circuits ought to be perfectly recalled. This is necessary in order that the shortest possible routing consistent with good service be chosen.

"In the routing of calls you often find them sent clear 'around Robin Hood's barn' to get to a given point possibly only a few miles distant, often using several times as many miles of circuits as is necessary. There are several reasons for this. Our operators have always been instructed to get calls through. This makes indirect routing necessary to a certain extent at the present time, but this was more especially the case in earlier days of Independent telephony when there were but few circuits. Conditions have changed, however, very rapidly, so that now we find that a network of circuits covers the country, comprising more than eleven thousand miles of circuits in Michigan alone. This represents an investment running into millions of dollars and in order to get the best possible returns from this investment it is necessary that these circuits be used judiciously. Therefore, an operator should use discretion as to whether or not a call is of enough importance to tie up a round-about circuit to get to the points of destination, or whether the call should be held up until the direct circuit is available. We find, however, that it is the custom of many offices to try their direct circuits to the given points, and finding them busy they immediately put the call through over some other route. To mention a specific illustration: Battle Creek may have a call for Grand Ledge. The book routing is via Lansing, a total of 54 miles. But, on finding that circuit busy they ring Grand Rapids for Grand Ledge, using 104 miles of circuit, when, with a delay of perhaps one or two minutes the call would have been completed over a shorter route and not only have saved using the extra 50 miles of circuit but could have given better service and perhaps avoided delay on some more remunerative call on another circuit.

"Another reason is that operators occasionally seem to believe that the instruction given them in the rate books for the handling of the long distance business is all right in its place but that they are not expected to use it. An operator may try to build up her message as she thinks advisable, regardless of any instructions she may have been given. In this case not only will the call be delayed a considerable time in getting through to point of destination, in all probability, but there will be the possibility of inferior service, in addition to which the operator at the first switching station has a record of a through call from A to C when in reality there was no such message.

"To avoid these conditions the manager, first of all, must become, not only interested, but familiar with his telephone geography. In fact, so familiar must he be that he will be able to talk about the long-distance business to the employees of his office, and get them interested. He should go over the instructions with them, and explain just what they mean and just how they should be carried out; not once, but time and time again until they know no other way of handling the business. One of the greatest educators said that education never stops, but that after taking a certain study one should review it, and then review it, and then keep on reviewing it. This principle is especially true in the toll business. The manager should keep going over this matter with the employees in a way that will not arouse their antagonism, not in a way that would cause them to be afraid of him, but in a way that will win their confidence and cause them to talk freely on the subject with him. He should have a circuit map of the entire state, if possible, but if this is not obtainable he should at least have one showing the circuits out of his particular office. Then he should trace these through with the operators, taking up the conditions at the various switching points where his circuits connect, so that the operators will become familiar with them and will know just what is the best thing to do when emergency arises. Once in a while there are found managers or operators who have the 'don't care' habit, and simply will not do as they are requested and when people of this stamp are found there is only one treatment that is of any lasting benefit, and that is to dispense with their services. I am glad that this is true only once in a while, for the rank and file of the army engaged in the telephone business are loyal, progressive and alert to the best interests of their respective companies and the business as a whole."

More Good Advertising From Norfolk, Nebraska.

A couple of days ago about every good citizen in Norfolk, Neb., received through the mail an envelope. It was one of those good looking envelopes, with a neatly written address, not in a business school hand, that made each wonder just what interesting thing was inside. Opening the envelope revealed a neatly folded paper, of a quality that is seldom seen in business stationery. Unfolding the sheet brought to view, in attractive script, the following letter:

"Perhaps you are not aware that the Independent Telephone Company, the Automatic system, is giving a superior, high grade, long distance service between the principal cities and towns in this and neighboring states.

"We want to impress you with the fact and extend a personal invitation to use our long distance lines. We reach with copper long distance circuits the following cities: Omaha, So. Omaha, Lincoln, Fremont, Sioux City, Sioux Falls, Minneapolis and St. Paul, including the intermediate points and branches. We also give a rapid long distance service to the immediate surrounding territory. All of our instruments are supplied with long distance transmitters.

"Our rates are right and you will find that we will handle your business with politeness and dispatch."

Yours respectfully,
Norfolk Long Distance Telephone Co.,
W. J. Stadelman, General Manager.

Just another stunt of General Manager Stadelman's for advertising "Long distance" and a mighty effective one, too. Has any one else a good one?

Providence Judge Holds Court by Telephone.

At Providence, R. I., a few weeks ago Judge Wright tried and convicted three men who had been arrested on charges of revelling.

The men were unable to speak English, and when they were arraigned, no interpreter could be found. The cases were continued and court dismissed. Judge Wright went to his office a half mile away, and had scarcely arrived there when he was called and told that an interpreter had been found.

The judge read the charge to the interpreter, who translated it for the defendants, the interpreter received and transmitted pleas of guilty, the fines were imposed and paid, and court was again dismissed.

History of the Automatic Telephone*

By Arthur Bessey Smith

Assistant Professor in Telephone Engineering, Purdue University.

It will be profitable at this point to examine some of the details which have been developed by the experience of the years up to 1902. We have seen that the earliest inventors tried to use switches moved by electromagnets, and that these motor magnets, as they may fitly be called, were placed directly in the line. This method proved a flat failure. Even the perfecting of the magnet could not make it a success.

To escape the difficulty two courses seemed open. The first was to drive the switch by an independent motor and control its movements by magnets, the latter having very light duty. The second was to reduce the switch friction, operate it by motor magnets on local circuits, and control these circuits by relays in the line. The Strowger development, which is just now occupying our attention, follows this second line of attack. Other systems which we shall take up later operate on the motor-driven plan.

To distinguish the two principal classes of electromagnets from each other the words "relay" and "magnet" are used. A relay is an electromagnet which has for its only duty the controlling of other circuits, as the vertical relay, which controls the vertical magnet, or the ringing relay, which switches on the ringing current. A magnet is one which moves apparatus directly, as the vertical magnet, which by its magnetic pull lifts the wiper shaft, or the private magnet, which allows the side-switch to slip from notch to notch, though the motive power comes from a spring. The magnets are usually much lower in resistance than the relays, and require considerable current. Those magnets having only 25 ohms resistance, and receiving full battery voltage would take two amperes if the current were allowed to flow steadily. But it is not likely that such current ever flows, since these low resistance magnets are operated by interrupted current, which probably has not time to arrive at full value between impulses.

The magnet must be quick-acting and powerful; the former to enable it to follow the impulses as fast as they come, the latter so that it can move the apparatus promptly and certainly. To meet this need a form with a good magnetic circuit was used, one in which the air-gap is as small as possible

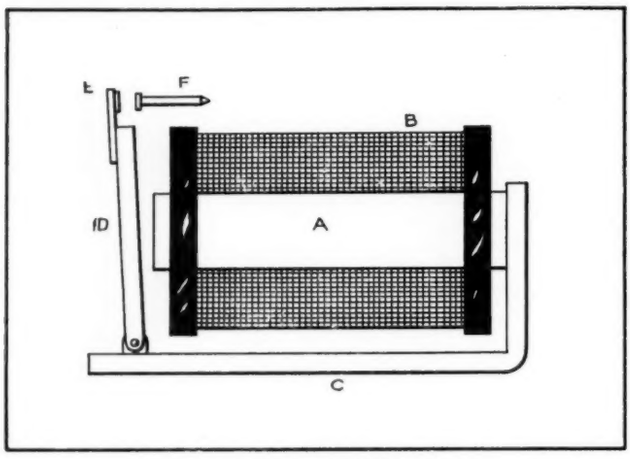


Fig. 79. Form of Old Style Relay.

and yet allow considerable motion. The knife edge armature, such as is used in the Western Electric line relay at the present time (1908) was not a success, as there was too little iron at the knife edge. The successful magnet is U-shaped and has two coils, one on each limb. This gives a solid magnetic circuit in iron, except at the two armature air-gaps. The play in the pivots is made as small as possible, for a little lost motion is fatal to high speed action. In addition, the restoring spring is applied in such a way that in its normal position it will press the armature against the side of the pivot bearing, against which it will be pressed by the energizing of the coils.

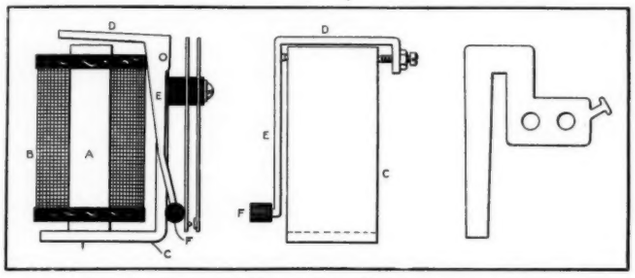


Fig. 80. Form of More Recently Developed Relay.

The breaking of the heavy current required by this magnet produced a destructive arc at the contacts of the controlling relay. This was at first reduced by a 150 ohm non-inductive shunt placed around the winding. This has given way to a copper shield or tube on the core. Of course the use of platinum contacts was found to be imperative.

An entirely new form of relay was also necessary. The first commercial relays were probably those used in telegraph work. They must be sensitive, quick acting, and capable of ready adjustment from day to day. There is no reasonable limit to their cost, as they are used in comparatively small numbers and form a small part of the total cost of a telegraph line. When the common battery telephone system began to come into use, it also demanded relays, but of a different type, though for a time the telegraph relay was pressed into service in many places. They need not be quick-acting. They should be adjustable, but rather of the permanently adjustable type, for line conditions must not affect them as much as they do the telegraph. But above all things the common battery telephone relays must be as cheap as is consistent with good apparatus, since their number runs up into thousands in a single office. For this purpose the modern telephone relay of various types has been developed.

But the automatic system calls for still another kind of relay, which is in some ways a cross between the telegraph and the telephone as to requirements. It must be quick-acting and accurate,—if possible more so than the telegraph relay. Its requirements as to adjustment are the same as for the ordinary telephone relay. But there is a greater necessity for limiting its cost, since more are used per line than in the manual.

The early inventors had not grasped the idea of speed. Their switches were operated by push buttons at the substation. The user would probably push the buttons not faster than four impulses per second, a rate which was easy for even a poorly designed relay to follow. It soon became apparent that if the automatic were to win, it must act with greater speed. The relays were improved, the automatic sender (dial) introduced, and the speed of impulses increased to from 10 to 20 per second.

The general form of one of the older relays is shown in Fig. 79. The core, *A*, carries the wire, *B*. A soft iron piece *C* forms the second pole of the magnet. The armature, *D*,

*Continued from issue of Jan. 2, 1909.

is pivoted on the end of *C*. The solid piece, *E*, is fixed to the armature and carries the platinum rivet. When energized the armature pulls up toward the pole of the core *A* until stopped by *E* striking *F*, the stationary contact. There was

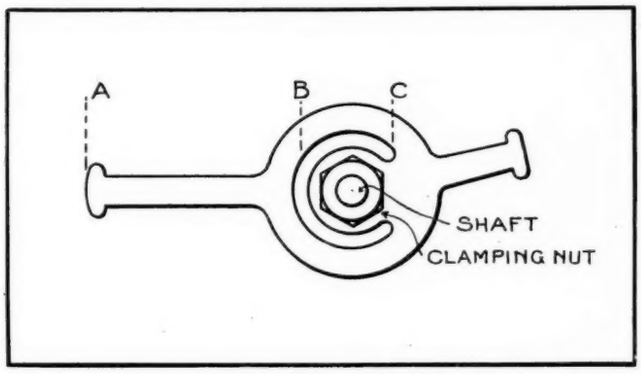


Fig. 81. Detail of Wiper.

no elasticity in the contact, and no sliding action between the platinum rivets.

The present relay, whose form was established about 1901 or 1902, is shown in Fig. 80. At the left is a front view, in the middle its right side without springs, and at the right a single spring. *A* is the core, on which is placed the winding *B*. The return limb of the magnetic circuit is *C*, which carries the pivots for the armature *D*. Attached to the armature is a long arm, *E*, carrying an insulating plunger, *F*. The latter moves the springs, which are mounted on the return limb, *C*. Attention should be called to the shape of the spring, at the right, Fig. 80. Though limited vertically so that a short, stiff spring would seem to be the only possibility, yet by its unverted U shape it has the effect and elasticity of a much longer spring.

It will be seen that the air-gap between the armature and pole is small while relatively large motion of the plunger, *F*, is obtained. The ratio of plunger to armature motion is about 2 1/3 to 1. Also there is a very good path for magnetic lines of force.

Working at high speed brought out the fact that the presence of a few short-circuited turns in the winding very materially reduces the rapidity with which it will follow signals. These short-circuited turns prevent the armature from falling back promptly and thus tend to run the impulses together. So it was necessary to use the greatest care in winding, testing, and

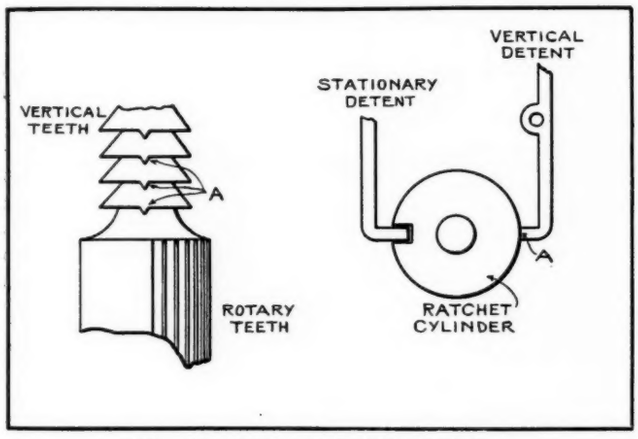


Fig. 82. Details of Ratchet Cylinder.

handling relays and magnets for automatic work. These requirements are much more severe than for manual work.

The circuits of the automatic exchange were originally fused the same as in other telephone plants. But the high voltage of the automatic soon made it necessary to subdivide the protection into smaller units. The heat coil replaced the fuse at the switches, the automatic people designing and making a type of their own. At first both battery leads, ground battery and main battery, were protected, but by the time Chicago was installed the heat coils in the ground lead were omitted in accordance with manual practice. Each switch was provided with two heat coils, called "external main" and "local main" respectively. The former supplied battery to the vertical and rotary lines through the line relays, and was so named because its current went out of the office. The local main heat coil supplied all the rest of the apparatus in the switch, which was on locally completed circuits.

The individual interrupter for operating the rotary magnet came into use about this time. It consisted essentially in providing the rotary magnet with a spring contact which would break when the armature was attracted. This contact was wired in series with the winding. When connected to battery the resulting vibratory motion was not unlike that of an ordinary battery door bell. The conditions were more severe, as the contact had to remain closed until the magnet had completed its forward thrust and rotated the wipers onto

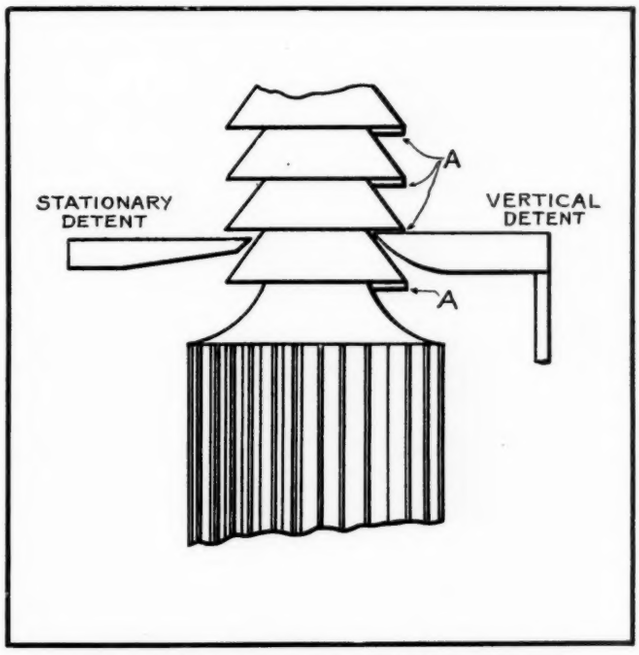


Fig. 83. Ratchet Cylinder, and Relations of Detents.

their next contact. It must then remain open until the armature had been pulled by its spring back far enough for its pawl to catch the next tooth of the ratchet cylinder. There was not the inertia of a long lever and hammer, as in the door bell, to lengthen the stroke. The moving parts were light compared to the forces moving them, and the forward stroke was against a variable resistance. The result was finally obtained partly by the design of the springs and partly by their careful adjustment.

For the proper working of the switch it is essential that all the movements shall be performed in a certain order. This order is fixed by the side-switch—which is the key to the average machine. To prevent the side-switch from being accidentally moved from its initial position before the right time is the function of an attachment of the release magnet. The vertical and rotary detents are in one piece, and pivoted. Attached to a lever on these detents is a rod running to the side-switch. When the release magnet is energized, it pulls up and allows a spring loop on its armature to drop over a lug on the lever of the vertical and rotary detent piece. When the release magnet falls back, it rotates the detent piece, lifting the detents from the ratchet cylinder, so that the wiper shaft

can return to its normal position. At the same time that the detent piece rotates, it pushes the rod running to the side-switch, thereby resetting the later. During idleness the release magnet retains its hold on the detent piece, preventing the detents or side-switch from moving.

The armature lever of the vertical magnet lies just under the spring loop of the release magnet. On its first upward motion this lever lifts the spring loop off the lug on the detent piece. The detents come at once into action, but the side-switch is controlled by the private magnet as has been described.

To keep the side-switch from going into its third position too soon, there is a large cam or blade on the shaft just below the ratchet cylinder. A lug on the side-switch lever projects toward this long cam. After the wiper shaft has been lifted, the private magnet will slip the side switch into its second position. Here the lug on the side-switch lever will rest against the long cam on the shaft, and the side switch cannot move farther until the shaft has rotated at least one notch.

While the shaft is in its normal position, no rotary motion is possible. This is secured by having attached to the top of the wiper shaft a finger which drops down behind a stationary peg. This peg is just high enough to hold the finger from moving, yet the latter will clear it when lifted one notch.

The difficulty of securing sufficiently flexible wipers in the small space available was solved as shown in Fig. 81. The effective length of the ordinary spring would be from *A* to *B*, but by this device it is lengthened to the distance *A-C*.

By having all parts made to interchangeable sizes the switch was designed to be easily removed from the bank. The latter was wired into place and expected to stay there, for little or no trouble was experienced with it or its wiring. But the switch proper could be removed and a new one substituted while the old one was repaired, all without disturbing the bank. To do this, and be sure that under the conditions of average use the wipers would line up and move freely over all of the 300 contacts is no small feat.

At the left of the wiper shaft, opposite the vertical portion of the ratchet cylinder, is a stationary detent, fastened rigidly to the framework. Its end projects into a channel cut in the teeth acted on by the vertical magnet. It is the duty of this detent to carry the weight of the shaft while rotating, and prevent any downward motion from injuring the wipers. During the upward motion the weight of the shaft has been held by the vertical detent, which is in one piece with the rotary detent. When the rotary magnet makes its first move, the weight of the shaft must be transferred from the vertical detent to the fixed detent above mentioned. To do this with the least possible friction is the object of the following device.

Fig. 82, at the left, shows a portion of the vertical ratchet cylinder, the upper end of the rotary portion showing below. On each of the teeth will be seen a small downward projection, *A*. During the upward movement these projections are in line with the vertical detent, and at every step one of them rests on it. At the right in Fig. 82 will be seen the relation between the detents. These little projections, *A*, hold the shaft a little higher than necessary, so that the bottom of a tooth is a little above the top of the stationary detent (See Fig. 83). Therefore, when the rotary motion begins the shaft will be let down easily onto the stationary detent instead of being forced on.

(To be continued.)

Idaho Mendacity and Humor.

A reporter for the Hailey, Idaho, *Times* recently published an item which made an auspicious start with the statement that one "G. R. Armstrong, the superintendent of the Eastern Idaho Division of the Rocky Mountain Bell Telephone Company, with headquarters at Pocatello, and who is spending a few days on Wood river, is probably as well informed a man on telephone matters as there is." It goes on to say that "He went into the Chicago office of the company when a boy, and was promoted a step at a time, until he became assistant to the president. He was then sent out on the road to bring the branch companies and their equipment up to date. There are 35 of these subsidiaries in the United States, and as no one man could look after all of them there are several organizers or supervising engineers of which Mr. Armstrong is one.

"The Independent companies, Mr. Armstrong says, do not offset the Bell companies. They only help. The service of the Bell is so superior that the patrons of the Independent lines soon return to it even at higher rates."

(Here is where he missed one—wait until a "wicked promotor" digs that up in the newspaper files and explains the point.)

"The Bell companies never cut their rates because of the invasion of their field by new companies; and the Independents soon find themselves compelled to raise their rates or go out of business. In the meantime their patrons get a very unsatisfactory service. So that they must either use only the Bell or both it and the Independent service. But competition never damages the Bell."

"Spokane has the largest percentage of development of any city in the world.

"The automatic system, of which we hear so much, has proved a failure. After several years' trial the automatic boards were returned to the home office of the Bell company in Boston. Marshall Field & Co. and others who had put them in, tried them for six to 24 months, and ordered them removed."

The above contains some new points, and the telephone man who can read it without cracking a smile misses some of the joys of life. Imagine the glee of the genial G. R., fearful of the competition which is such a bugbear to his company on account of Independent success in Montana and elsewhere, when he found a "cub reporter" willing to swallow it whole. No Boston ready-made "publicity material" does with Armstrong! He makes his own good and fresh, and boosts the company, with G. R. occupying the position of prominence, at the top, where the cream gathers.

Cable Bugs Which Are Real Insects in California.

Trouble in cables, due to the piercing of the sheath by boring insects, such as was probably first called to the attention of telephone men in this country by Mr. John Hesketh, electrical engineer of the Postmaster General's Department of Australia, has been experienced in various localities in California.

Mr. A. E. Madison, general manager of the Home Telephone & Telegraph Company at Santa Barbara, Cal., has just written us an interesting letter on this subject, saying:

"Our experience has been rather limited, inasmuch as the trouble reported occurred only during the last two years, following our winter rains. We have not yet seen a 'cable bug,' and we presume the insect raises his family and goes away during the summer, before we are aware of the damage he has done, which is made evident by the first rain. The hole is about ⅛-in. in diameter, perfectly round, and very similar to a wormhole in a log, with the exception that on the inner side of the lead sheathing the hole is a little larger than on the outside, presumably for the deposit of eggs.

"A peculiar feature of the case was that most of our trouble occurred in proximity to zinc hangers, rather than marlin hangers, and was confined to two or three blocks in the Chinese quarter."

LETTERS ON PRACTICAL SUBJECTS

Improved Iron Wire Connection.

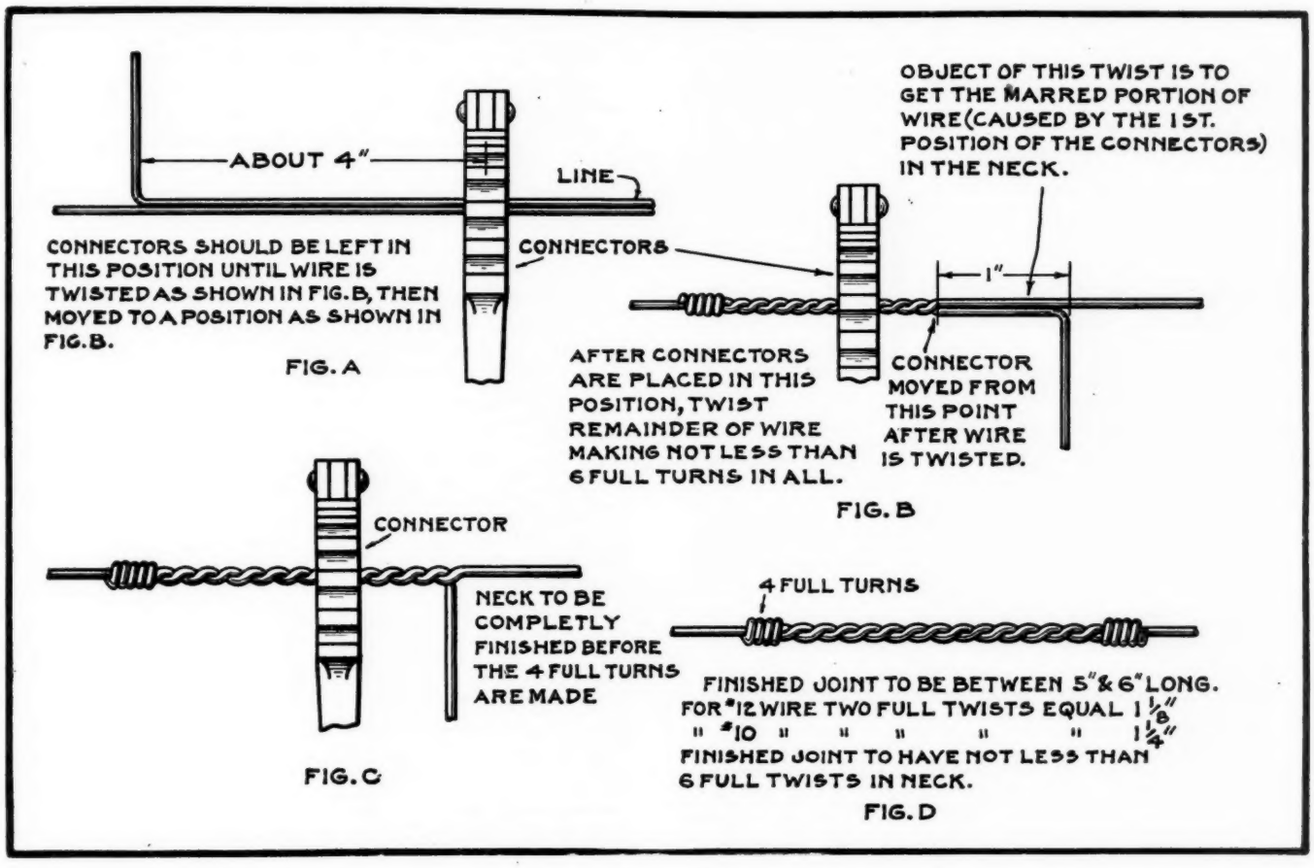
Letters appearing in TELEPHONY issues of Dec. 19, 1908, and Jan. 16, 1909, on the question of proper and improper connections, have prompted me to forward to you the enclosed print and general letter on our standard iron wire connection. Following is the letter:

Improved Iron Wire Connection.

In making the improved iron wire (sleeveless) connection, there should be more or less strain on the wire, in order to get the same impression on both wires in the neck.

The required amount of turns in the required amount of space must be accomplished without allowing a full turn at point of pliers (see blue print A-81, Fig. C). Make the four full turns in half connection after neck is complete. If you allow a full turn on the line wire, while working on a taut wire especially, before making the required amount of twist turns in the required amount of space, you will burn and part your line wire.

Do not leave any connector or plier marks on the wire beyond the neck or tails. In removing the waste ends, after connection is made, make an impression with your pliers as close as possible to the connection, turn two-thirds around line wire, then turn waste end over as sharp as possible and as close as possible to the line wire, and the waste end will break off at the impression, leaving a clean smooth finish.


ABOUT 4"
LINE
CONNECTORS SHOULD BE LEFT IN THIS POSITION UNTIL WIRE IS TWISTED AS SHOWN IN FIG. B, THEN MOVED TO A POSITION AS SHOWN IN FIG. B.
FIG. A
CONNECTORS
OBJECT OF THIS TWIST IS TO GET THE MARRED PORTION OF WIRE (CAUSED BY THE 1ST. POSITION OF THE CONNECTORS) IN THE NECK.
1"
AFTER CONNECTORS ARE PLACED IN THIS POSITION, TWIST REMAINDER OF WIRE MAKING NOT LESS THAN 6 FULL TURNS IN ALL.
CONNECTOR MOVED FROM THIS POINT AFTER WIRE IS TWISTED.
FIG. B
CONNECTOR
NECK TO BE COMPLETLY FINISHED BEFORE THE 4 FULL TURNS ARE MADE
FIG. C
4 FULL TURNS
FINISHED JOINT TO BE BETWEEN 5" & 6" LONG.
FOR #12 WIRE TWO FULL TWISTS EQUAL 1 1/8"
" #10 " " " " " 1 1/4"
FINISHED JOINT TO HAVE NOT LESS THAN 6 FULL TWISTS IN NECK.
FIG. D

Improperly made iron wire connections in lines connecting rural line companies, of which we have many, are the hardest faults we have to battle with, and we find the companies in question follow the teachings of TELEPHONY, along with some of the less important magazines.

The two-wire connection shown in the issue of Dec. 19, 1908, has long since been one of the past, and, at this advanced age, is an unserviceable one. It has hardly one full turn in the neck, within a space of 7/8 of an inch, and has not been used by any well-groomed company since the day of the solder pot on line wire, which was made necessary for both tensile strength and points of contact.

The three-wire connection mentioned in the issue of Jan. 16, 1909, as shown in the cut, is much better than the two-wire connection, due to its construction. The third wire plays little or no part, as far as service is concerned, but is much stronger than the first mentioned. This connection was a creation on the part of the telegraph companies, at the birth of the hard drawn copper wire, long before the sleeve became the standard connection for copper wire. The sleeve for splicing iron wire was the latest ready-made joint, and has recently been laid among the curios.

The accompanying print sets forth the latest connection that has been passed by our engineers as the best creation to date and adopted as their standard iron wire connection.

Yours very truly,

Harrisburg, Pa. T. H. Nevitt,
Division Plant Supt. American Union Telephone Co.

Ringing Current Closes Bad Iron Joint.

In our local battery "express" system the subscribers on a party line complained of trouble in getting "Central," although they had perfect incoming service.

After some trouble the fault was found in a joint on the iron line, which the current from the pole changer, by arcing across, closed for an O. K. instrument reading and test for a short time after the line was "rung over."

Tucson, Ariz. J. B. Andruss.

The Alberta Government Reduces Telephone Rates.

The Department of Telephones of the Province of Alberta, Canada, has announced reductions in rates from the telephone exchange at Fort Saskatchewan over the Government system as follows: To Edmonton, 25 per cent; to Lamont, 25 per cent; to Mundare, 25 per cent; to Chipman, 45 per cent; to Wetaskiwin, 45 per cent; to Lac Ste. Anne, 45 per cent.

The reductions have been made by the Government on its system all over the Province and these show to what extent the reduction has been carried.

The Telephone in the Courts

Conducted by A. H. McMillan

Railroad Crossings in Kansas.

We have a short piece of line that crosses the railroad track on poles carrying the single wire about thirty feet above the track. The wire is strung on brackets. The other day I received word from the superintendent of the railroad that the wire at this crossing (a public place) should be strung on cross arms. I spoke of the matter to one of the section bosses and he said it is a state law which requires cross arms to be used where telephone lines cross a railroad. No one here has a copy of the statute in question, and there is some question among some members of our company as to the veracity of my informant. Will you please tell me in your periodical if the section boss was right? If so, does the law specify the size of the cross arm and how they are to be fastened to the pole, and the wire to the cross arm? Also, how high should the wire be above the track? An early answer will greatly oblige.

We do not know of any such statute existing in the state of Kansas as the one referred to by the railroad section boss.

Protection Apparatus on Rural Lines.

In installing telephones on rural lines, this company uses a copper block protector, being just the same as the carbon block protector, which has between the carbon a mica of 5/1000 of an inch thickness, allowing this space between the carbon blocks in contact with the line wires and the carbon blocks in contact with the ground wire. The copper blocks used by us have just the same space made by the mica as the carbon blocks have. In installing these protectors, we do not use the line fuse.

In your opinion, in case of damage to a building containing the above described protection or in case of personal injury from lightning entering a house having the above equipment, would there be any technical reason why we would be any more liable where we installed the protectors without the fuses than if we had the fuses installed?

We cannot see any technical reason why there should be any more liability where you install the protectors without the fuses as above described than if you had had the fuses installed. The question of whether you had sufficiently complied with the duty of furnishing protection would be one to be determined by the jury after hearing expert testimony on the subject. It is a question of fact rather than a question of law, and would depend in such case upon the facts, circumstances and evidence. We are informed that the standard practice of a large number of well managed companies is to omit the line fuses on rural lines which are not exposed at any point to high potential currents.

Cross Arms Projecting Over Railroad Right-of-Way.

Please cite us to decisions as to whether a railroad company in Kentucky has a right to keep us from placing cross arms on our poles that are set on land abutting their right-of-way. The land is owned by a farmer and poles are entirely on the private land, but so close to the right-of-way that the cross arm would extend from 12 to 24 inches over the railroad land at a height of from 20 to 25 feet above ground, but in no place reaching or crossing the tracks.

It is intimated that the railroad company will try to stop us from putting on any arms that may extend over its land. If there are no decisions, please say what you think about a railroad company owning land to the extent of keeping us off. I am of the opinion that the land owner has as much to do with the air as the railroad company, as the railroad company owns the land only for railroad purposes, and it goes back to the land owner if the railroad track is abandoned. This railroad, however, is being operated.

We know of no decisions in Kentucky on the subject inquired about above. It is our opinion that the railroad company is entitled to such a use of the right-of-way as to prevent a telephone company from placing its cross arms in such a way as to extend over the railroad right-of-way. By statute in the state, telegraph companies, which usually include telephone companies, are given the right to construct, maintain and operate lines on, along and upon the right-of-way and structures of any railroad in the state, upon making a just compensation and provided the poles, etc., be erected and maintained in the usual manner, and so as not to interfere with the ordinary use of such rights-of-way and structures. If the telephone company is unable to come to any agreement with the railroad company, it may obtain such right by condemnation proceedings. Kentucky Statute, Chapter 125, A., Sec. 4679 A.

Connection Between Farmers' Lines and Urban Company.

We have a lot of telephone lines in this part of the state and they are owned by the farmers, but they run into the central office, and we have also lines that do not run into the central office. A bell and a switch have been put in so that we can talk on our own lines to each other, and by this means we save calling up the central, for they charge us from 10 to 25 cents to talk on our own lines, and they tell us that they will cut out our line that goes to the central office if we use the switch. Those that are on the line that goes into the central office pay 50 cents per month and furnish their own telephones and line. Can they cut out these lines that pay because they switch and talk to each other? Some people on these lines do not talk to central at all. This is a Bell office, and if they cut us out we will put up one of our own offices, as they are doing in some other parts of the state. Could we sue them if we are cut out?

Under your statement above, I think that after you have paid 50 cents per month for each telephone on the line, all of your obligations are performed, and the Bell company cannot insist upon further charges for conversation. Of course, you could not connect to the Bell central office, for switching, any telephone which was not paying the 50 cents.

Counterclaim in Suit for Printing Directories.

A separate answer was filed in the district court yesterday in behalf of James A. McKee in the suit brought by the Home Telephone Company of Puget Sound against James A. McKee, Fred Ballbach and E. M. Thompson, as directors of the Independent Telephone Directory Company of Montana. The action was brought to recover on a contract for printing and delivering 18,000 telephone directories a year at the rate of 6,000 copies every quarter. In the answer it is denied that the plaintiff company, whose headquarters are at Tacoma, fulfilled the terms of the contract, and there is a demand for heavy damages in the way of a counter claim.

It is alleged that the plaintiff company delivered only one edition of the directory and that was 4,000 copies instead of 6,000. Further, it is stated that no provision was made for the letter "X" in the alphabetical index in the directory, and the plaintiff refused to print in connection with the directory the advertisement of a company that makes a tonic preparation. It is claimed that there was nothing objectionable in the advertisement that justified the plaintiff company in omitting it from the directory.

Must Not Put Wires in Courthouse.

At Brownstown, Ind., a temporary restraining order, has been granted against the Central Union Telephone Company to prevent the placing of telephones in the courthouse. The company built a line to Brownstown, a few days ago on a franchise granted in 1902, which gave the company the privilege of one line of poles and wire and one pay station. After putting in the pay station, the company began wiring the county buildings.

"Slugging" a Slot Machine Is Counterfeiting.

At McAlester, Okla., George J. Moffit, a resident of Oklahoma City, has been bound over before the United States Commissioner, charged with counterfeiting. Moffit was alleged to have been putting lead slugs in a telephone slot box which bore the imprint of a United States quarter.

Practical Questions and Answers

Inductive and Non-Inductive Coils.

What is meant by a non-inductive winding, and what is the manner of winding different from an ordinary coil or helix? What is the difference between a resistance coil and an inductance coil?

A non-inductive winding is one which produces no magnetic effect. When wound in the ordinary way, the flow of a current of electricity through a coil produces magnetism in and about the coil. If the current changes in strength,

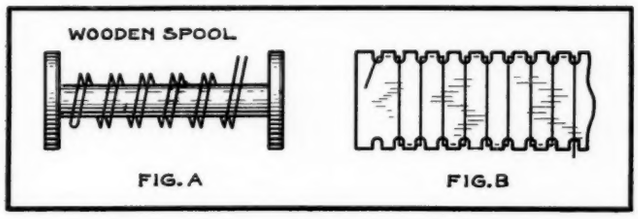


Fig. 1.

the magnetism produces a voltage in the coil which *opposes the change*. This effect is called by various names, such as "retardation," "inductance," "reactance," etc. "Non-inductive" means without induction.

One way to wind a non-inductive coil is to run out the total length of wire needed, cut it off, double it back on itself, and wind this doubled wire on the spool as if it were one wire. (See Fig. 1, *A*.) Another way is to make a pasteboard tube, wind the wire on it as for an ordinary coil, boil it in paraffine, and while hot press the tube and wire out flat. This makes a coil of negligible area, and very small inductance. Another is to wind the wire on a cardboard, with slits or notches cut in each end, as shown in Fig. 1 *B*. All the wire lies on one side of the card, and is therefore in one plane. Another method is to wind on a wooden spool one layer in a given direction, then put on the second layer in the reverse direction, the third layer in the first direction, and so on, having an even number of layers so that each layer shall neutralize the magnetic effect of the layer under it.

A resistance coil is one used for its resistance alone, and should be non-inductive. An inductance coil is one wound in the ordinary way and usually on an iron core, so as to have a large inductive or "choking" effect.

Unbalanced Telephone Circuits.

Will you kindly show me, diagrammatically, the conditions of an unbalanced circuit, and what effect it will have on telephones connected only at the two ends of the circuit? I would also like to know what books can be had dealing with the effects of capacity in a simple manner.

When a line is balanced it means that the leakage from

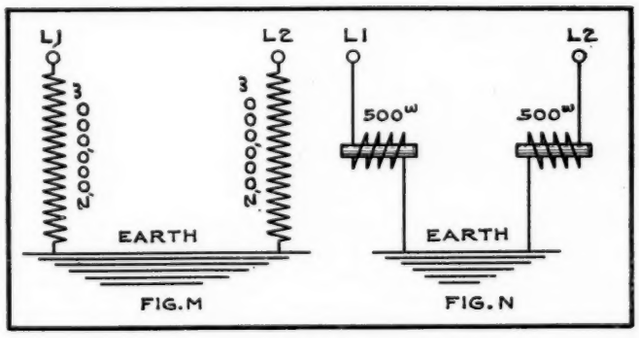


Fig. 2.

both sides to earth and to any other circuit which may disturb it are equal. The nature of this leakage may be simple, non-inductive resistance, like surface leakage across insulators or wet trees. It may be inductive, in the form of relays or retardation coils connected from the sides of the circuit to earth or other circuits. It may be capacity, in the form of a condenser effect between the two line wires and other line wires running near them.

Referring to Fig. 2, *M* let L_1 and L_2 be the two wires of a telephone circuit. If each has a leakage resistance of 2 megohms (2,000,000 ohms) to earth, the circuit will be balanced. Or if, as in Fig. 2, *N* there are two relays connected one from each wire to earth, and the relays are of equal resistance and

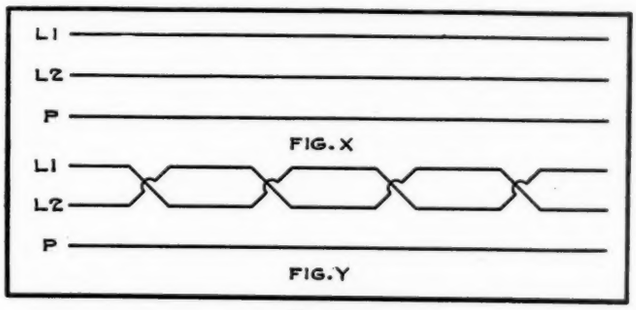


Fig. 3.

inductance, the line will be balanced. But if one of the relays is lower in resistance and inductance, the line will be unbalanced.

If in Fig. 3 *X* L_1 and L_2 are the two sides of a telephone line, not transposed, and *P* is a wire carrying power current, the telephone line will be unbalanced if the influence of *P* on L_2 is greater than on L_1. This will cause noise in the telephones no matter where connected, as long as they are bridged across the line. This influence may be through the condenser relation between the wires or the magnetism produced by the disturbing current. If properly transposed, as indicated by Fig. 3, *Y* both L_1 and L_2 are made to share equally the influence of the disturbing wire, *P*, and the line is said to be balanced.

Read "Telephone Lines and Their Properties, by W. J. Hopkins.

Connecting Magneto Telephones.

Given a grounded party line, instruments all of similar make, connected in multiple, does it make any difference practically or theoretically which side of the instruments is grounded or if all have the same side grounded?

If the bells are non-biased, that is, all bells ring at once, it makes no difference which line binding post is connected to ground. It could make no difference in either talking or ringing, since both currents are alternating, and useful all the time they pass through the instrument. But if the bells are biased with a spring and it is intended to ring half of the bells at once (semi-selective) then care must be taken to get the right terminal of each bell to line or ground. This is because pulsating current is used to ring them, and it makes a difference which way the current passes.

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

Telephone News

Vermont Passes Public Utilities Bill.

The legislature of Vermont has just passed a bill whereby a Public Service Commission will be created to replace the former Board of Railroad Commissioners. It will have regulative powers over all public service corporations, including telephone companies. Provisions of the bill affecting telephone companies give the Commission powers as follows: To examine books and records, and persons under oath; to require companies to furnish information on operating accounting and financial matters; to make investigations upon complaint or upon its own motion; to regulate quality, price, location, sufficiency and maintenance of plants, and require placing of wires underground; construction and manner of operating; to prevent unjust discriminations; to prevent improper issuance of securities; the organization of new corporations; to decide contested questions of right-of-way necessity and compensation.

Section 14 provides that no public service corporation shall be organized without a certificate from the Commission, granted after a public hearing, held in the county where its business is to be carried on, "to determine whether it will promote the general good of the state to permit such corporation to organize and engage in such business and also to determine and fix the amount of the capital stock of such proposed corporation"; also that "no license, permit or franchise shall be granted to any company to own, operate, manage, control or engage in any business subject to supervision under this act in any municipality where there is in operation a public utility engaged in similar service, without first obtaining from the Public Service Commission a certificate, after notice and public hearing of all parties interested, as herein provided as to new organizations, that the public convenience and necessity requires such second public utility."

Further provisions are that companies subject to the provisions of the act shall annually file with the Commission schedules of rates, and exhibit to the public in each of their offices such portions of these rate schedules as the Commission may require to be so shown. The expenses of the Commission, including salaries of clerks, experts, etc., is to be distributed among, and borne by, the public utility corporations in proportion to their gross earnings.

There is no provision that like rates for like services shall be charged in different parts of the state.

The final section provides that "in this act or previous statutes shall be construed as giving the Public Service Commission power to prevent or restrict competition or limit the number of persons or companies who may engage in the business of furnishing light, heat, power or any other business subject to supervision under the provisions of this act in any town."

This clause was inserted as an amendment to the bill as originally proposed, and vigorously pushed by Governor Prouty and some of his close associates. The Independent telephone companies believed that the bill was directly aimed at them, with the intention not only of preventing new Independent development, but of giving corrupt politicians a powerful weapon against those now in existence. It was asserted that Governor Prouty is a stockholder in a prominent Bell sub-licensee company, and that the Bell company has diligently sought out local politicians with offers of employment, by the Newport *Express and Standard*, whose vigorous denunciation of the original measure was probably an important factor in bringing about the amendment. In the heat of the campaign this paper referred to the measure as "the outrageous Public Service Bill, not only reeking, as it appears, with Bell telephone interests, but, as we look at it, and as we believe unprejudiced men must and have looked at it, detrimental to every new-growing enterprise in Vermont."

President H. W. Buchanan, of the Vermont Independent Telephone Association, is understood to have performed able service in defending the interests he represents while this measure was pending.

Opposition to Telephone Regulation in Kansas.

In an hour's speech before the senate judiciary committee last week, J. W. Gleed, of Topeka, criticized the Hamilton public utilities bill and showed why it was not needed in Kansas. He said that it had been shoved onto the legislature because some one had read in the magazines about the awful record of public utilities in New York, Boston, and other big cities of the east, and immediately decided that Kansas should be protected against her utilities. The difference in conditions, he said, between Kansas and eastern cities had not been taken into consideration at all.

"The people of Kansas are not clamoring for this bill. In fact they have made no demand for it whatever. The public utilities of Kansas are struggling along, trying to make a living. They are robbing no one. The people are now getting better service than they are paying for."

He suggested that the committee give some regard to conditions at home, instead of conditions in New York and Boston. If there were no demand for such a law, he asked why the legislature proposed to saddle the expense on the people. He did not think the state expects to get five men at $2,500 a year who are competent to virtually control $600,000,000 worth of property.

"Why, you can't even get a superintendent of the Topeka street railway for that salary," said he. "Wisconsin spent $65,000 last year, and only valued seventeen of the 1,089 of its public service corporations, and yet if the bill has any merit at all it is the valuation provision."

Getting down to the telephone business, which he represents, Mr. Gleed said that there was keen rivalry in the business; that his company had sixty-two plants in the state, and thirty-one of them had competitors. He did not think that the state should step in and regulate any private concerns which were regulated by competition; the state should only step in and regulate monopolies. The telephone business was not a monopoly.

After charging off for depreciation, he declared, no telephone company in the state was making any money. He was not there to say that he was in favor of this bill with certain amendments.

"Other representatives have told you that," said he, "still they haven't brought in any bills of their own. I am opposed to this bill, and am not afraid to say so. The company I represent has no votes behind it. But it has $3,000,000 invested in Kansas, and it must depend upon your sense of justice for protection."

Former Attorney General A. A. Goddard, representing the Independent Telephone Company of Topeka, also appeared before the committee and argued against the bill as it is now constructed. He said there are more than three hundred telephone companies in Kansas. The stock of the companies is held principally by the people of the state. He believed that the stockholders in practically all of the companies would be agreeable to fair regulation relative to the issuance of stocks and bonds. In the telephone companies, he declared, there is no "watering" of stocks or frenzied speculation. "I do not believe," said Mr. Goddard, "that the Independent telephone people over the state know the real con-

tents of the public utilities bill now under consideration. If they did know, there would go up a protest that would be heard all over the state."

Program for the Iowa Convention.

That the Iowa convention is to be as good as can reasonably be expected is made clear by the following program for the meeting to be held at Des Moines, March 9, 10, 11:

TUESDAY, MARCH 9, 1909.

2 o'clock p. m., meeting called to order; reports of officers and committees; appointments of regular and special committees; presentation of new business.

WEDNESDAY, MARCH 10, 1909.

10 o'clock a. m., meeting called to order; addresses by E. H. Moulton, president International Association, Minneapolis; "Reasonable Connection Relations," by William Crownover, Hudson; "Reasonable View of the Future;" by George Atkinson, Creston; address by W. J. Thill, manager of the Clearing House, Des Moines.

2 o'clock p. m., president's address—"Reasonable Returns on Investment," by J. H. Shoemaker, Waterloo; address by John Mac Vicar, Superintendent Streets and Public Improvement, Des Moines; "Reasonable Construction for Small Companies," by J. M. Plaister, Ft. Dodge, Ia.; address by Howard Baker, manager Sioux Falls Telephone Company.

THURSDAY, MARCH 11, 1909.

10 o'clock a. m., "Reasonable Accounting for Small Companies," by C. A. Peterson, Manchester;; "Reasonable Attitude toward the Public," by P. C. Holdoegel, Rockwell City, Ia.; "Reasonable Objects of Accounting," by George W. Fawkes, Waterloo, Ia.; "Value of Timber Preservation," by George H. Erich, Chicago, Ill.

THURSDAY AFTERNOON, MARCH 11, 1909.

2 o'clock p. m., election of officers.

Keystone Company's Statement.

The comparative statement of earnings of the Keystone Telephone Company of Philadelphia for December, 1908, is as follows:

	1908.	1907.
Gross earnings	$88,854	$87,356
Operating expenses and taxes	43,323	45,523
Net earnings	$44,531	$41,833
Six months ended Dec. 31:		
	1908.	1907.
Gross	$528,237	$524,636
Operating expenses and taxes	261,778	277,334
Net	$266,459	$247,302

Independent Company at Columbus, Ohio, Reports Good 1908 Business.

The annual statement issued by the Columbus Citizens Telephone Company for the year 1908, made public at the annual stockholders' meeting February 9, shows a prosperous year despite the general unfavorable business condition which prevailed. One of the features of the statement is the fact that $125,000 has been written from the surplus to the reserve for depreciation. The managers of the local company are to be congratulated on their method of looking after the depreciation account.

The statement for the year shows $294,409.25 received from telephone rentals and $12,447.80 from telephone calls. Miscellaneous receipts were $149.78 and the gross earnings of the Franklin County Telephone Company, a subsidiary corporation, were $55,009.46, making a total income of $362,016.29.

The expenses of operation, maintenance and general expense were $176,819.37, and the taxes $17,897.95, making the total expenses and taxes $194,717.32. This, subtracted from the gross income, leaves $167,298.97, the net earnings.

The interest on bonds was $32,450, and other interest charges $2,011.07. The dividends on preferred stock were $45,000, and the dividends on the stock of the Franklin County Telephone Company $7,500, leaving a net income of $80,337.90. The dividends paid on the common stock amounted to $35,625, leaving surplus and reserve of $44,712.90.

During the year $101,956.92 were expended in additions and extensions and $3,127.63 for real estate and buildings. The total number of telephones in operation January 1, 1909, was 14,832.

Public Utilities Bill for Minnesota.

It is reported from Minneapolis that a bill providing for a State Public Utilities Commission, with power to regulate telephones and other public service corporations, has been introduced in the legislature. The bill closely follows the Wisconsin law.

Petroleum Telephone Company of Pennsylvania Reports 1908 Most Successful Year.

That a well established and prosperous business, organized in 1901, should find the year 1908 the best in its history, is a condition which furnishes new testimony of the inherent strength of the telephone business. Yet, good as have been the returns of many companies, the annual report of the Petroleum Telephone Company contains items indicating especially good management.

The company operates exchanges at Oil City, its headquarters, Franklin, Titusville, and Pleasantville, Pa. The company now operates 4,210 stations, of which 484 were added last year—a gain of 11½ per cent. In addition to this station growth, the company has acquired considerable property formerly owned by neighboring rural companies, and has built a considerable amount of new pole line to towns adjoining its territory.

The financial statement shows that the company earned over 11 per cent on the $189,000 common stock, and that it purchased, at par, and cancelled $4,250 of its own bonds. There was a gratifying increase in receipts from toll business. Following is a condensed statement of earnings and expenses submitted to the stockholders by General Manager W. S. Paca:

GROSS RECEIPTS.

Rentals	$69,850.89
Tolls	10,257.39
Mesenger	291.13

EXPENSES.

Operating	39,743.64
General	3,330.40
Profits available	$37,325.37
Bond interest	9,972.50
Preferred stock dividends	4,348.15
Sinking fund	1,750.00
Other items	1,200.00
Surplus	$20,054.72

Following are figures showing the steady improvement in the company's condition during the past three years:

Year.	Receipts.	Expenses.	Profits.	Fixed Charges.	Surplus.
1908	$80,399.41	$43,074.04	$37,325.37	$17,270.65	$20,054.72
1907	70,312.67	42,358.72	27,953.95	12,417.50	15,536.45
1906	59,880.40	34 929.36	24,951.04	9,978.32	15,191.31
Inc. over 1907	10,086.74	715.32	9,371.42	4,853.15	4,518.27

RATIO OF OPERATION.

	1907.	1908.
Expense to income	60.24	53.57
Profit to income	39.76	46.43
	100.00%	100.00%

The company, in addition to its own system, has over 1,000 rural telephones connected with its exchanges in Oil City, Franklin, Titusville, Pleasantville and Clintonville. At the annual meeting the old board of directors were re-elected, and consists of P. M. Speer, president; E. T. Roberts, vice president; William S. Paca, secretary and general manager; R. G.

Lamberton, W. E. Hayes, George B. Kalb and W. A. McMaster; C. M. Lamberton is the treasurer.

The directors authorized an extension to the Oil City switchboard and the expenditure of over $25,000 in new cables and construction work necessary to take care of the increasing demand for the company's service. A new general office is being fitted up for the use of the auditing department and general manager's office.

Cuyahoga Report for December.

The December report of the Cuyahoga Telephone Company, Cleveland, Ohio, shows:

	Dec., 1908.	Dec., 1907.
Gross earnings	$69,662.49	$68,159.53
Total expenses	32,539.45	31,442.26
Net earnings	37,123.04	36,717.27
Interest on bonds	11,283.34	11,250.00
Surplus	25,839.70	25,467.27
Deductions from surplus:		
Dividend on preferred stock	7,186.75	7,186.75
Depreciation reserve	3,249.95	2,193.92
Total deductions	10,436.70	9,380.67
Surplus	15,403.00	16,086.60

Indiana Telephone Bills.

Three or more bills, relating to telephones, have been introduced in the Indiana legislature. Senate Bill No. 284, introduced by Senator Ranke, is a bill providing that telephone companies may lease property of other telephone companies. It is understood that this bill, if enacted into law, will add relief to the situation in Indianapolis, although the court has held they may do so under present statute.

House Bill No. 273, introduced by Representative Wells, is an act to regulate telephone companies, the principal feature giving them power to purchase smaller companies. It is given out that this measure is in the interest of the Ft. Wayne Home Telephone Company, and it may become a law.

House Bill No. 280, introduced by Representative Stevens, provides that the expense incurred by police, sheriffs or other city and county officers by use of telephones in apprehending criminals shall be paid by city and county. This measure grows out of a case in Gibson County, where the long distance telephone was used in apprehending a criminal by detectives and sheriff, and the county refused to pay the toll line fee.

Wisconsin Attorney General Makes Public Utilities Law an Excuse to Protect Monopoly.

Attorney General Gilbert, of Wisconsin, has announced his decision to decline to begin suit in the name of the state for the forfeiture of the charter of the Wisconsin Telephone Company, on account of its absorbing competing concerns. Attorney General Gilbert's ruling is that the public utility law of Wisconsin forces any public service corporation to give efficient service, so that there can be no application of the anti-trust statutes in the case of such service, either telephone or telegraph.

Ohio Legislation.

Although the Republican leaders and Governor Harmon are opposed to the creation of a public utilities commission, the friends of such a commission will fight for a law of that character when the general assembly reconvenes after the extended adjournment. Frank W. Wood, author of the public utilities bill pending in the house of representatives, so our Columbus correspondent reports, had an extended talk with Governor Harmon last week, with the result that he announced that he would use every energy toward having the bill enacted into a law.

Mr. Wood was urged by Governor Harmon to eliminate from his bill all reference to the creation of a commission and restrict the bill to the creation of a tax board to replace the several taxing boards made up of state officials. After a talk with State Executive Chairman Henry A. Williams of the Republican committee, Mr. Wood announced that the committee was opposed to the utilities bill.

In case Mr. Wood makes a fight for the passage of the bill a determined fight will be made by all public service corporations, including all Independent telephone corporations. There seems to be a difference of opinion, and as a result the "wiseacres" predict no public utilities bill, either in the form of the Wood bill or some modified form, will be enacted at the present session of the legislature.

Independent Statistics for Ohio.

Ralph Reamer, treasurer of the Ohio Independent Telephone Association, is busy compiling the report of Independent telephones as compared with Bell stations, in operation in Ohio. The report will be completed for the annual meeting of the state organization to be held at the Hartman Hotel the third week in March.

The report will show a large increase in the users of Independent telephones since the last report made by Mr. Reamer. It will show that fully two-thirds of the telephones in Ohio are Independent. Increases will be shown in practically every one of the nine districts of the state. The greatest increases will be shown in the first and ninth districts.

The incompleted figures indicate that the Independents have 900 exchanges, while the Bell have but 300. The Independents gained about 5,500 stockholders during the year 1908. The Independents have about 1,700 toll stations, while the Bell have 850 stations.

The figures so far as are in show the Independents have in operation 324,663 telephones and the Bell 172,225. While the position of Independent telephone companies in the state have been materially strengthened during the year, they have not yet reached their zenith, but the prospects are good for still further development during the present year.

The figures show what competition has done for the telephone business in every branch. It has bettered service, increased the number of telephones and has made the investment more secure for all concerned.

Bell Company Files Demurrer to U. S. Telephone Suit.

Seventeen exceptions to the petition of the U. S. Telephone Co., preventing interference with its exclusive contracts have been set forth in papers filed in the U. S. Circuit Court of Ohio by Doyle & Lewis, for the Central Union Telephone Company and J. W. Warrington, of Cincinnati, for the American Telephone and Telegraph Company.

It will probably be some weeks before a decision is rendered on the matter of a permanent injunction. The determination will be made by Judge Tayler, who issued a temporary injunction in favor of the Independents.

Fair Newspaper Work.

A good example of fair reporting is seen in the Joplin (Mo.) *News-Herald*, which follows the announcement of the cut-over of a new Bell telephone exchange with a general article on the operation of the company. However, the editor was apparently well aware of the keen competition existing between the rival companies, and so headed the article "Telephone Systems," and gave items of interest concerning the Home company in the same article.

Case Heard by Telephone at Columbus, Ohio.

At Columbus, Ohio, on Jan. 28, Magistrate Bostwick conducted an entire hearing in a civil case. The case was that of Amelia Jameson against Samuel Shelton for room rent. The defendant did not appear to contest the case. Attorney Ward Clutch, from his office in the Board of Trade, gave his testimony to the magistrate over the telephone. Judgment was granted for $12.50.

No More Reduced Rates for Coupon Books in South Dakota.

On application of the South Dakota State Telephone Commission the attorney-general has just rendered a decision to the effect "that the issuance and sale of coupon books by telephone companies whereby a message may be sent by the holder of the book at a less rate than a similar message may be sent by a person who does not hold a book, is prohibited by section 12, chapter 239, of the Session Laws of 1907."

This is in accordance with the law adopted by the legislature of 1907 making it impossible for any favoritism to be shown any individual by any corporation of public utilities.

Under the interpretation of the attorney-general, coupon books hereafter will be sold at their face value.

Physical Connection Bill in Iowa Legislature.

A bill was introduced by Senators Adams and Moon in the Iowa state senate, on February 3, which provides that in each city or town where more than one telephone exchange is maintained, each exchange must make connection with each other's exchange. The bill is opposed by most of the Independent companies in the state, and it is urged that the passage of such a law means aiding a return to a monopoly of the telephone business in the state.

Idaho Wants Telephone Regulation.

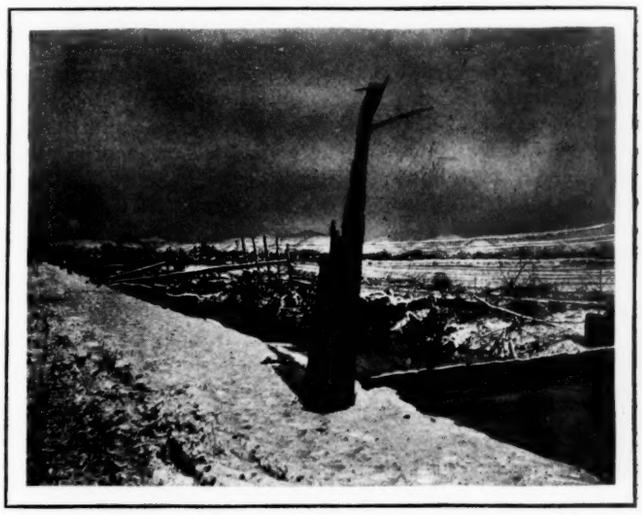
Just to be in style, Idaho legislators are taking a rap at the telephone business. Senator Sweeley, of Twin Falls, has introduced a bill in the senate, the object of which is to give any city or village the power to regulate the rates of individuals, associations or corporations serving the public. The bill was referred to the corporations committee.

Damage from Sleet at Winona, Minn.

The accompanying photographs were taken just after a sleet storm which occurred at Winona, Minnesota. The Bell company seems to have suffered rather extensively, owing to the fact, as reported, that its poles had been up from fourteen to sixteen years and the line was nearly in condition to be replaced. The damage to the lead, as photographed, occurred in the southern part of the city, on the main toll line to La Crosse.

The poles of the electric light company and of the Winona Telephone Company are standing, thus making these pictures a very clear demonstration of the fact that a line in good condition will stand up under the stress of severe weather.

The severity of the storm is proven by the photograph of the covering of a short piece of wire, in connection with a close examination of the pictures of wires photographed while lying on the ground.



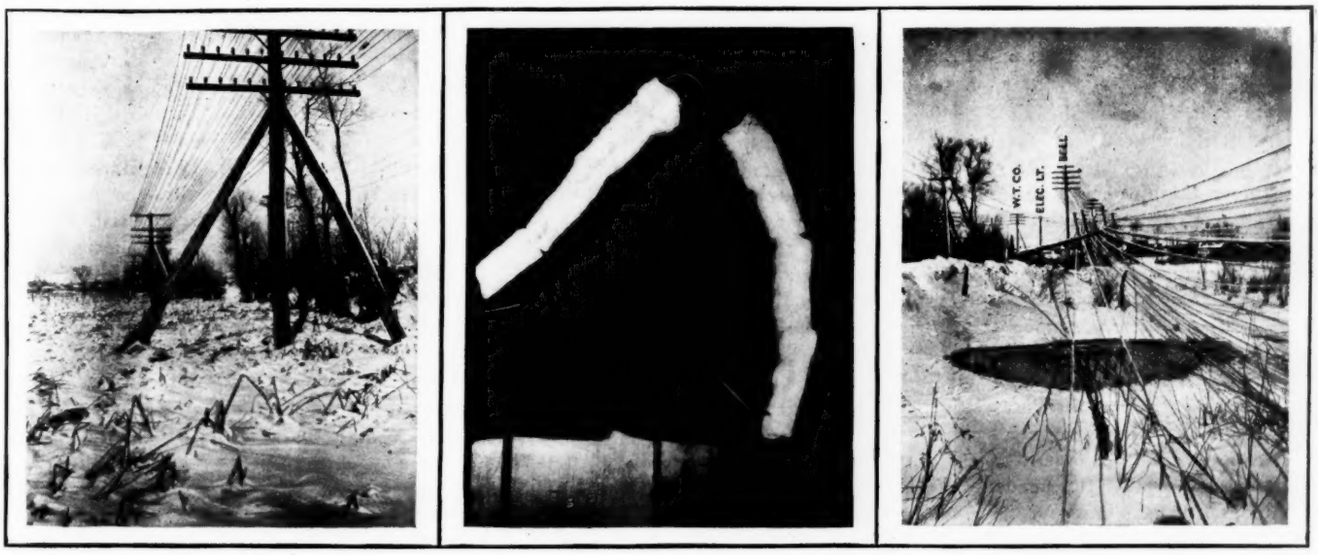
The Bell Company's Line Near Winona, Minn., Four Days after a Recent Sleet Storm.

Telephone Company Sues Thirty Delinquent Subscribers.

On Jan. 20, at Meridian, Miss., the Meridian Home Telephone Company filed thirty suits against various alleged delinquent subscribers before Justice of the Peace T. G. L. Keene. The total amount for which the telephone company is suing is approximately $200.

Pennsylvania Judge Holds Court by Telephone.

At Kittanning, Pa., while quarantined in his home by the board of health on account of his little daughter having scarlet fever, Judge Harry Wilson held court over the telephone, hearing motions and making orders to the attorneys and the clerk, who were assembled at the court house.



A Contrast Between the Independent and Bell Telephone Lines Near Winona, Minn., after a Recent Sleet Storm. Also Piece of Wire Showing Thickness of Sleet Coating.

Independent Clearing House Organized in Illinois.

Presidents and general managers of Independent telephone companies of Illinois met in Peoria Tuesday, January 26, and made plans for establishing an Independent telephone clearing house. The meeting was held at the call of a special committee appointed at the last state convention of the Independent Telephone Association of Illinois at Champaign, Ill., and after an all-day session, which was attended by about 60 delegates, a committee was appointed to draw up incorporation papers for the establishment of a clearing house such as is conducted in other middle-west states. The committee on incorporation was named as follows: J. W. Barrett, Pekin, Ill.; C. B. Cheadle, Joliet, Ill.; C. Irwin, Macomb, Ill. The new company will probably be capitalized for $15,000, and the indications are that it will be located at Peoria, Ill.

C. B. Cheadle, of Joliet, vice-president of the Interstate Independent Telephone and Telegraph Company, called the sessions to order and presided as chairman. C. W. Farwell, manager of the Kinloch company, of Bloomington, acted as secretary. The delegates listened to W. J. Thill, of Des Moines, Ia., manager of the Iowa clearing house, who explained the workings of his system. The delegates were unanimous in the opinion that a clearing house is needed in Illinois and will not only be of advantage to the Independent companies in that it will mean a more equal distribution of toll charges and profits, but that it will centralize the toll situation in the state in such a manner as to afford better service for the public.

At the present time the state of Illinois is the only middle western state without a telephone clearing house. The system is now in use in Ohio, Michigan, Indiana, Iowa, Nebraska, and other western states.

Another meeting of Independent operators will probably be called within the next four weeks, at which time it is expected arrangements will have been completed for incorporating, and a permanent organization may be effected. Peoria is favored as being best located for such an institution.

Among the cities represented by presidents and managers at Tuesday's meeting, were: Peoria, Decatur, Pekin, Galesburg, Aurora, Champaign, Streator, Bloomington, Springfield, Joliet, Sterling, Freeport, Kewanee, Galva, Monmouth, Macomb, Jacksonville, Washington, El Paso, Pontiac, Henry, Eureka, Havana, and Dalavan.

Informal Organization of New York Independent Men.

At a recent meeting held at Rochester, New York, several officers at the heads of the larger Independent companies operating in New York state organized a so-called conference committee, the members of which will meet every two months, or oftener, to discuss methods of improving the work of their companies, and harmonizing operating policies. The officers of the committee are: Geo. R. Fuller, Rochester, president; R. Max Eaton, Niagara Falls, secretary, and W. Roy McCanne, Rochester, treasurer. Among the other representatives at the meeting were: B. G. Hubbell, Buffalo; J. H. Wright, Jamestown; J. B. Pierce, Syracuse, and J. C. Poole, Utica. The next meeting will probably be held in Syracuse on February 20.

Independent Convention in Southwest Kansas.

Members of the Independent Telephone Association of southwest Kansas and western Oklahoma met at Meade, Kansas, on January 20. The meeting was called to order by the president, F. I. Bennett. C. A. Sloan, of Pratt, secretary of the association, was present.

A resolution was passed favoring the present tax law. Many practical subjects were discussed. Dodge City was selected as the meeting place for next year.

The following officers were chosen for the year: President, A. G. Barnett, Dodge; vice-president, H. P. Garrett, Beaver; secretary, Harry Williams, Meade.

The folowing members were present: F. I. Bennett, Meade; H. H. Williams, Meade; R. A. Brannan, Meade; Dr. H. E. Landis, Great Bend; C E. Boyer, Plains; A. G Barnett, Dodge City; F. A. Gresham, Bucklin; T. J. Smith, Liberal; John L. Riley, Minneola; H. P. Garrett, Beaver; J. W. Phelps, Cimarron; E. T. Bidwell, Kinsley; C. C. Raymond, Greensburg; C. A. Sloan, Pratt; C. Van Doren, Fowler; C. J. Ruch, Haviland; A Myers, Pratt.

Enid Rate Case Heard in Oklahoma Supreme Court.

The supreme court at Guthrie, Okla., has heard arguments in the Enid telephone case, wherein the corporation commission sought to compel the Pioneer company to restore the rates for telephone service which were in effect before its recent raise, and the company appeals from the order of the commission.

Hunt Chipley of New York had charge of the case for the telephone company and was assisted by Henry E. Asp of Guthrie and S. H. Harris of Oklahoma City, while Assistant Attorney General George A. Henshaw represented the corporation commission. In his argument, Mr. Chipley spoke very highly of the patience and courtesy shown by the corporation commission in hearing the case and declared that all the telephone company wanted was a reasonable return on the actual value of its plant, not including franchises and good will; that anything above that ought to go back to the public. He also declared that the constitution and laws of Oklahoma imposed no new duties or obligations upon public service corporations, but merely crystallized the obligations imposed upon them under the common law. He stated that the burden of truth was upon the telephone company and that the commission ought not to be reversed unless the proof was full and ample.

Pennsylvania Independents Discuss Plans for Improving Toll Service.

At a meeting of managing officers of leading Independent telephone properties of western Pennsylvania, held at Kittanning, arrangements for improving the facilities for toll business were made.

To further the objects advanced, an organization was effected by electing T. J. Shufflin, of the People's Telephone Company, of Butler, as president, and H. E. Webb, of the Pittsburg and Allegheny Telephone Company, of Pittsburg, as secretary. Those present at the meeting were: H. F. Webb, Pittsburg; E. D. Schade, Johnstown; W. C. Paca, Oil City; S. C. Thayer, Beaver; Dr. J. K. Brown, Brookville; Dr. J. A. Haren, Summersville; T. J. Shufflin, Butler; W. L. Malin, the American Union Telephone Company, Harrisburg; G. E. Crist, Blairsville; J. C. White and B. H. Putney, New Bethlehem; A. P. Addleman, Eau Clair; J. W. Knapp and Frederick Knapp, Clarion; Dr. C. J. Jessop, K. B. Schotte, Charles Neubert and Dr. F. C. Monks, of the Kittanning Telephone Company.

Bell Business in Butte, Mont.

The Rocky Mountain Bell Telephone Company expects to occupy its new exchange building on West Broadway in Butte, Mont., when permitted to do so by the labor unions with which it was in conflict a long time. The company has been working intermittently on the building for several years, and it is now approaching completion and the new equipment will soon be installed. Although the company has settled all its labor troubles, it has not recovered from the set-back it received, and it is doubtful that it ever will, because its long suspension of operations at a time when the Independent company was just starting gave the latter an advantage that it will always hold.

Telephone Warns Subscribers of Break in Gas Main.

A few weeks ago there was, in the city of Brooklyn, N. Y., a tremendous explosion which blew up a section of gas main, and killed more than a score of people. Following this explosion it became necessary for the gas company to warn all users of gas to turn off the gas cocks until the great break in the main should be repaired. The telephone was selected as the best available medium, and The New York and New Jersey Telephone Company was requested to deliver the warnings.

Sixty reserve operators were summoned immediately, and as fast as the gas company could prepare lists of the subscribers in the affected district, the telephone operators informed them over the wire that there had been a serious break in the gas main, warned them that it might affect the gas supply for the night, and urged them to turn off all gas cocks in case the gas failed to light.

In this way it is estimated that they quickly reached 10,000 persons who were subscribers, and by these, in turn, the word was probably transmitted verbally to 3,000 more persons.

A New Method of Telephone Advertising in the West.

The opportunities for selling advertising space are often overlooked by telephone companies. Directories have, of course, been utilized for years and, while that may be and is systematized by many companies, there is still another field that is broad and practically unexplored in country around Kansas City, Mo. It is that of the pole sign advertising.

The plan is absolutely new in that section of the country, the Bell people being the first to take it up. They now have something like 5,000 of these signs out and have a number of large contracts in sight. The sign is steel enameled, 20 gage, and the usual size is 20 ins. by 28 ins. It is hung from the pole on brackets of steel and is guaranteed to stand up under anythng but a small boy's target rifle.

These signs are designed for use outside the city limits because in many municipalities there are ordinances against such appendages from telephone poles within the city limits. Damage suits are also avoided by placing the signs in the country where there would be no chance of them blowing down and injuring someone.

U. S. Commission Gives Favorable Report on Telephone Train Dispatching.

In its report to Congress the block signal and train control board of the Interstate Commerce Commission says that teiephones recently have been extensively introduced in the United States in lieu of the telegraph or block signaling, and have been found to operate admirably.

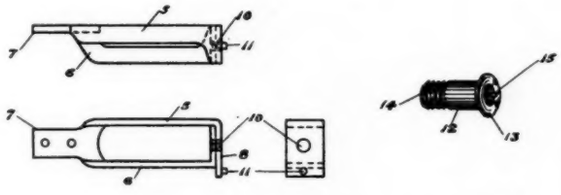
Telephone Patents

Conducted by Max W. Zabel

CONNECTING JACK FOR TELEPHONE SWITCHBOARDS.

C. H. Smith, Chicago, Ill., patent 911,338, Feb. 2, 1909.

A new jack construction is here shown, which consists of the flat portion 7, upon which the springs are to be mounted, and which is so punched that the side members 5 and 6 come together at the front portion thereof. The central aperture 8 is adapted to receive a holding thimble 12, and the projection 11 prevents the jack frame from rotating when mounted. A



small slot 15, is provided in the thimble to permit of its rotation.

TELEPHONE APPARATUS FOR DEAF PEOPLE.

C. H. Viggars and E. H. Stoltz, Chicago, Ill., patent 911,531, Feb. 2, 1909.

This transmitter consists of the carbon plate having slots therein, in which balls are placed, which balls rest against the diaphragm and are agitated thereby. The device is supposed to be used in connection with a battery which is carried in the pocket, and a holder is provided for attachment to the clothing. The trumpet is provided with catches which hold it in the transmitter proper.

SUPPORT FOR TELEPHONE RECEIVERS.

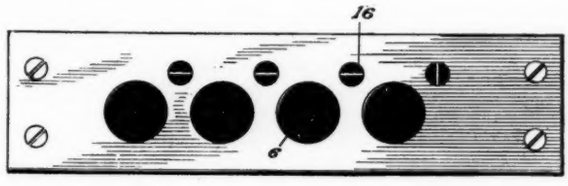
R. S. Griffith, Berkeley, Cal., patent 910,918, Jan. 28, 1909.

This patent shows an adjustable arm for holding a receiver adjacent to the telephone, the arm being mounted in a support which permits of vertical and horizontal adjustment of the receivers held therein so as to adjust it to the ear. A plug is used to hold the switch-hook down when the telephone is not in service.

PARTY LINE INDICATING KEY.

C. H. Smith, Chicago, Ill., patent 911,339, Feb. 2, 1909.

The four-party indicating key of this patent has means in connection with the plungers 6, whereby the auxiliary plungers



16 are rotated whenever a key 6 is depressed, to indicate which key was last called.

INTERCOMMUNICATING TELEPHONE.

H. C. Thomson, Boston, Mass., patent 911,181, Feb. 2, 1909.

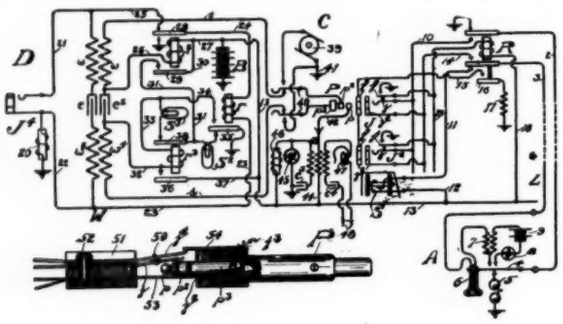
This patent covers a calling system for intercommunicating telephones, and consists of the plungers, which are provided with the pyramidal extensions which operate through a plate which, through the agency of a spring, holds any plunger which is depressed while talking is in progress. When the receiver is restored to the switch hook, an arm is raised, which releases any plunger. The actuation of a second plunger also releases the first plunger.

TELEPHONE-TESTING SYSTEM.

H. C. Goldrick, Indianapolis, Ind., patent 911,231, Feb. 2, 1909.

A test circuit for telephone systems is here illustrated and consists of a separate thimble *j*3, which is adapted to be

grounded by the cut-off relay *R*, when the line is in use. The tip of the plug passes through a tertiary winding of the operator's induction coil and from there to the live side of the battery. The arrangement is such that this tip of the plug is used only for testing, and does not connect to the talking springs,



the talking circuit being completed through the thimble and sleeve contacts of the plug. The plug is also cut away so that no conduction parts of the plug, when it is in use, are in contact with the test thimbles *j*3.

COIN COLLECTING APPARATUS.

R. Yearneau, Clark, S. D., patent 910,628, Jan. 26, 1909.

This patent relates to coin-controlled telephone substation apparatus, and has many novel features. The principal feature is the adoption of devices by which a coin or slug closes the circuit at the substation when calling the central station. The construction contemplates automatic means whereby, when a coin has been deposited, a certain quantity of service can be obtained, after which the line is again short-circuited until a further coin is inserted.

AUDIPHONE TRANSMITTER.

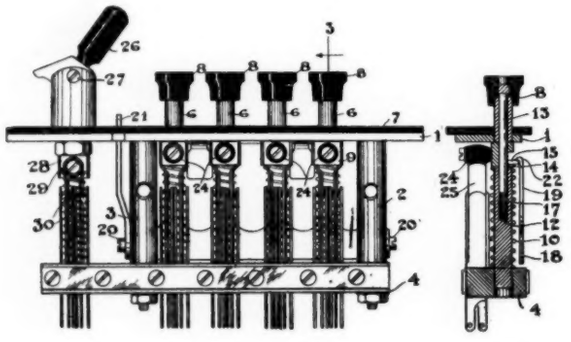
C. E. Williams, Natick, Mass., patent 911,101, Feb. 2, 1909.

This patent relates to an audiphone transmitter, and has a closed reverberatory chamber at its front side for receiving and amplifying the sound waves, and for conveying the same to the transmitter device. The transmitting device consists of a diaphragm resting against a carbon block, which has openings passing clear through it, these being the new feature of the transmitting device. Little pellets are provided in these openings, and a thin diaphragm of soft material prevents the displacement of the granules, but does not interfere with the movement thereof, nor the air passage therethrough.

PARTY LINE INDICATING KEY.

G. M. Campbell, Chicago, Ill., patent 911,377, Feb. 2, 1909.

The four-party line indicating key of this application is designed to provide means for indicating which key has been last

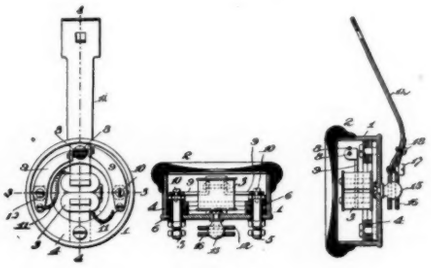


actuated, and consists of an internally movable plunger 13, which stays down when the key is depressed, through the agency of catch 22. When another key is depressed, the catch releases all plungers that are then in a depressed condition, allowing the springs to restore them to normal positions.

HEAD RECEIVER.

H. W. Sullivan, London, Eng., patent 911,178, Feb. 2, 1909.

The receiver shown is designed to provide means for removing a high potential charge without injury to the receiver coils, and to this end has two plates 9, 9, which are insulated



from each other and upon which screws 8, 8, are provided, which are adjustable, and which provide a multitude of discharge points between which the high voltage discharge can take place.

TELEPHONE TRUNKING SYSTEM.

C. S. Winston, Chicago, Ill., patent 911,188, Feb. 2, 1909.

A trunking system between magneto and common battery exchanges is shown in this patent, and consists in means whereby the drop in the initiating cord circuit can be operated when the trunking cord circuit is restored to its normal position. Likewise, when the calling magneto cord circuit is connected to the trunk jack, the lamp is lighted at the trunking board. Various features which contribute to this result include a slow-acting relay having a locking winding, which is adapted to operate when the disconnection of the trunking cord circuit takes place, which disconnection ordinarily releases the main winding of the slow-acting relay, but does not permit the contacts to be opened until the locking winding has had time to come into operation.

RECEIVER ATTACHMENT.

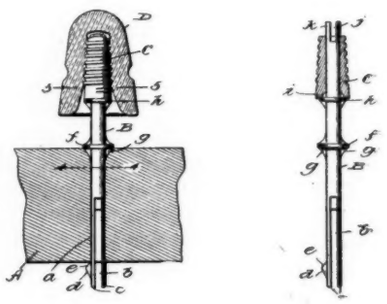
Wm. E. Peters, Athens, O., patent 911,438, Feb. 2, 1909.

A telephone receiver attachment is the subject matter of this application, and is designed to provide an annular chamber which entirely surrounds the ear, the receiver being screwed into one end of this annular chamber, and the other end of this annular cylindrical chamber being provided with a soft rubber cushion where it rests against the head.

INSULATOR PIN.

S. J. Edmiston, Greenwich, N. Y., patent 910,799, Jan. 26, 1909.

An insulator pin is described in this patent and consists of the body portion *B*, to the top of which the wooden support *C*



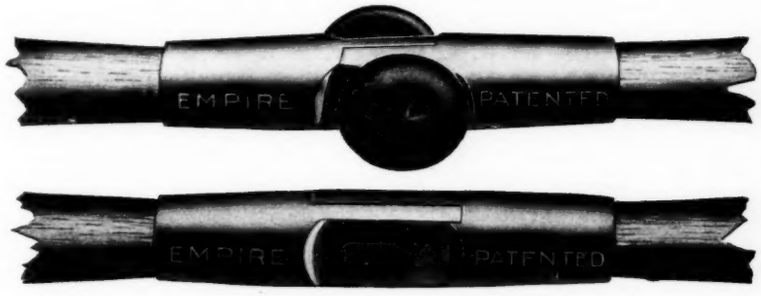
is attached, and can be held in place by the arms *k* and *j* when bent over. The lower end is bifurcated, and a catch *d* is provided so that when the pin is inserted in the cross-arm, it is held in place by said catch. The insulator, of course, is to be mounted upon the wooden portion *C*.

In the Manufacturing Field

Duct Rods.

Telephone companies who have underground conduit systems are interested in means for facilitating the work of drawing the cable into the conduit.

The illustrations show the Empire duct rods, which are made in three and four foot lengths, and provided with wheels and also without wheels. The rods are made of well-seasoned hickory, about one inch in diameter and tapering at the joint, which is made of malleable iron, so machined that side or end play is avoided. The ends of the rods are interchangeable, there being no rights or lefts and the construction is entirely open, thus avoiding the possibility of the joints becoming clogged with sand or clay.



The Empire Duct Rods.

The wheels are shaped to conform to the curve of the duct and are also staggered so that if one axle should come in contact with an obstruction on one side of the duct, the other side would be free.

These duct rods, which are becoming quite favorably known among telephone men, are manufactured and sold by the Diamond Expansion Bolt Company of New York city.

Duplex Metals Company, manufacturers of "Copper Clad" steel wire which is now being so extensively used by telephone companies, reports from its New York office that its western business has grown to such an extent that it is essential that an official of the company should take charge of the Chicago office. Accordingly Mr. J. F. Kinder, secretary of the company, assumed the management of the western office, in the Monadnock Block, on February 11. The many friends of Mr. Kinder who are in the West will congratulate the company on its decision to send so able and popular a representative to Chicago.

The Stromberg-Carlson Telephone Manufacturing Company is sending out a three-part return post card bearing the caption, "A Special Message to You." The cards describe the No. 890 iron-clad mine telephone and tell how to order the telephones and supplies for a "Mine-A-Phone" system.

The W. H. Kiblinger Company of Auburn, Ind., manufacturers of auto trouble wagons, has changed its name to W. H. McIntyre Company. The personnel and policy of the firm will remain the same.

Friction Tape.

In the early days of electrical manufacturing, the matter of insulation materials was on a most unsatisfactory basis. Thus, in insulating an armature coil, or a splice in an electric-light wire, tape was tape: no thought was given to its permanent insulation and adhesiveness, or to the possibilities of harm from its use due to mechanical, chemical or physical changes in it with age.

The essentials of a first-class modern friction tape, that give it the necessary electrical and mechanical qualities are:

Lasting quality, chemical neutrality, adhesiveness, moisture-proof quality.

First and most important is the durability of the tape in service—its "lasting quality." It must not only have good initial adhesive qualities, but must be free from all risk of drying out under the severe and repeated temperature changes to which it will be subjected, or under atmospheric conditions. When used to insulate joints in line conductors, exposure to alternating extreme heat and cold, and rain and dry weather, winds, acids or alkaline vapors, and varying mechanical strain, must not cause it to unwind, or otherwise affect the continuity and insulation of the protecting envelope that it provides. When used in the insulation of electrical machinery the heat that it gets, buried as it may be in the vitals of the windings, where it is subjected for long perids to the maximum temperature attained by the machine in operation, must not deteriorate or "age" it in any way—as by partially carbonizing it—so as to lower the insulation which it is depended on to give.

The material of the tape must be perfectly neutral: it must contain nothing that will attack the fabric or the impregnating insulation, or that will undergo chemical decomposition into such corroding substances. This quality is shown in practice by a test of the mechanical strength of the material, made several months after impregnating and coating it with the compound—a tape perfect in this respect shows no loss of strength after such space of time. Neither must there be present any substances that can corrode or deteriorate the copper over which the tape is wound.

Adhesiveness is a feature that sells many inferior makes of tapes. But the experienced and discerning buyer in deciding upon a tape that will give genuine and permanent protection to wire joints, and in all uses in the construction of electrical apparatus, looks further than to the mere initial adhesiveness. Observation after sufficient lapse of time "weeds out" many samples of inferior tape that have shown up well in respect to adhesiveness when the roll was first opened; the tape becoming dry, or semi-dry, refusing to seize or hold through loss of its original stickiness, or even unwinding itself from the joint. In the thoroughly satisfactory tape, the adhesiveness is permanent—substantially as good and strong many months after its application, as it was at first. On the other hand, the adhesiveness must be effective without being a nuisance or cause of delay in handling by sticking to the fingers of the workman. "Mussy" tape is a time waster, and moreover the kind of stickiness that it possesses is not of a sort likely to be permanent.

Moisture-proof quality is a feature that is especially required in tapes used in connection with the winding of electrical machinery. Owing to the fact that cotton absorbs moisture very readily, tapes to resist moisture must be very thoroughly impregnated with the compound, and the latter must be of good quality.

The line of friction tapes manufactured by the Massachusetts Chemical Company of Walpole, Massachusetts, it is claimed, stand successfully the severest practical tests in demonstration of their absolute permanence and durability and other essential qualities.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

MERCED, CAL.—The Dos Palos Telephone Company is a new organization which has filed articles of incorporation. H. T. Reynolds, A. S. Woodhouse, George Christien and others are the incorporators.

JANESTOWN, IND.—The People's Co-Operative Telephone Company has been incorporated to construct and operate a mutual telephone system in this place and vicinity. The incorporators are: Geo. W. Pierson, and others.

SALEM, IND.—The Kansas Telephone Company has been incorporated with a capital stock of $5,000. The directors are: Frank P. Martindale, Omer F. Mitchell and A. O. Marshall, Salem R. R. No. 7. The company proposes to build and operate a system in Howard township, Washington county.

BRINKLEY, KY.—The Sassafrac-Ball Telephone Company has been organized here by James Garnette and others with a capital stock of $1,000 fully paid in.

HARLAN, KY.—The Harlan Telephone Company was recently organized at this place by F. G. Green, H. D. Hall and others. Its capital stock is given as $4,000.

LITTLE CYPRESS, KY.—The Little Cypress Telephone Company has been incorporated by E. R. Goodloe, R. L. Holland and R. M. Jones, with a capital of $2,000.

DETROIT, MICH.—The Inter-County Telephone Company, an organization of Northville men formed for the purpose of constructing a telephone line in Wayne county, has filed articles of incorporation. The company is capitalized at $5,000, all of which has been paid in. Clement C. Yerkes, Louie S. Babbitt and Robert C. Yerkes, Frank Thompson and Frank A. Levins are the directors. The principal office will be at Northville.

BROWERVILLE, MINN.—The Ward & Moran Telephone Company has been organized to erect and operate a rural telephone line to Long Prairie. E. T. Crist is president and Frank Haverick, secretary.

PILLSBURY, MINN.—A meeting of farmers was held here recently to discuss the erecting of a telephone line in the country southeast of town. It was decided to build the line and a committee, consisting of Joseph Holmgren, Albert Nelson and Joseph Kruse, was appointed to get prices on material that will be needed to construct the line. Another meeting will be held soon to complete the organization of the company. The proposed line is to be about 15 miles long.

ST. PAUL, MINN.—The Stacy Telephone Company filed articles of incorporation recently in the office of the secretary of state.

CURRYVILLE, MO.—A new telephone company has just been organized. It is known as the People's Telephone Company. A number of the most prominent farmers of Pike county are on this line. E. Sparks is president and Ira Stone, secretary-treasurer of the company.

RICH HILL, MO.—Residents of the Mound Valley neighborhood met recently and organized a new telephone company by electing: James Baughan, president; Pete Flexner, vice-president; Geo. J. Relk, secretary; Frank Ford, treasurer; and S. F. Ray, Louis T. Fajin, Oliver Thompson, directors. The new company will be known as The Ray Telephone Company, and will build its line to connect with the Rich Hill telephone exchange.

HARLEMVILLE, N. Y.—A telephone company has recently been incorporated to operate a line from Harlemville to Chatham, and is known as the Harlemville-Chatham Co-Operative Telephone Company. It is capitalized at $600, and the organizers are: John B. Jones and William H. Angel. of Ghent; John Freehan, Peter Dexheimer and Frank W. Wolfe, of Auslerlitz, and Frank McNiel, of Hillsdale.

RALEIGH, N. C.—The Quaker Gapp Telephone Company of Mizpah is to erect and maintain a telephone system, its authorized stock being $3,000. W. G. Slate, J. W. Slate and W. C. Slate are the incorporators.

MARYSVILLE, OHIO.—The Union County Farmers' Telephone Company was organized recently at York with the election of the following officers: President, J. D. Coe; vice-president, Charles Vanhining; secretary, William Plotner; treasurer, J. O. Thomas; board of directors, Nate L. Moffit, Henry D. Inskeep, J. B. Herd, W. H. Joliff, Ora Coons and Harrison Longberry. The capital stock of the company is $24,000. The company expects to be ready for business within the next 60 days.

COUNCIL HILL, OKLA.—The Council Hill Telephone Company, with a capital stock of $10,000, has recently been incorporated. The directors are J. D. Faulkner and Robert Ward, of Chectotah; Thevor Faulkner and Otto E. Sump, of Council Hill.

GEARY, OKLA.—Articles of incorporation have been filed by the Atlanta County Telephone Company with a capital stock of $1,000. The directors are: A. B. Campbell, Otto Pallas and T. P. Quayle, all of Geary.

GUTHRIE, OKLA.—The Wichita Telephone Company, of Cache, has been incorporated with a capital stock of $8,000. The directors are W. K. Miller, W. E. Leckie, C. E. Hank, all of Cache.

PLEASANT HILL, OKLA.—The farmers in the immediate vicinity have organized an Independent telephone company. A charter has been taken out at Guthrie under the name of Pleasant Hill Farmers' Mutual Telephone Company with a capital stock of $2,000. The incorporators are Geo. W. Tannehill, W. F. Grinborg and C. F. Tibbetts, all of Pleasant Hill.

RUSH SPRINGS, OKLA.—The Isabella-Rush Independent Telephone Company has been organized here to fight the Pioneer telephone company in Steuben county. A charter has been taken out with a capital stock of $10,000. The company is to operate a local exchange at Isabella and at Rush Springs with rural lines between the two places. The directors are: J. A. Carver, W. T. Ruby, C. W. Runkin, A. C. Camp, and W. E. Perkins, all of Rush Springs.

BURNS, ORE.—Articles of incorporation were field recently by the Eastern Oregon Telephone & Telegraph Company, with J. R. Jenkins, J. H. Jordan and E. T. Jenkins as incorporators. The principal office is at Burns, and the capital stock is $10,000, in shares of $50 each. The intention of the company is to put in a line from Burns to Lawen, which will connect the Happy Valley line with the line from Burns to Paulina, both of which the company controls, also to make connections with Vale as soon as possible. Arrangements are under way to obtain connections with the Home Telephone Company lines.

ELIZABETH, PA.—A rural telephone company has been formed to build a line into Forward township and another into Elizabeth township. The officers are: President, J. W. McKinney; vice-president, J. H. Christy, secretary; W. P. Caldwell; treasurer, A. F. Peairs; directors, the foregoing, along with S W McConnell and A. T. Cowan. The order for the material necessary to construct the lines has been placed, and work will be started immediately.

COLUMBIA, S. C.—The Mechanicsville Telephone Company of Darlington, has applied for a charter. The capital stock is $800.

LEXINGTON, S. C.—The Hollow Creek Telephone Company has been organized to construct rural telephone lines to connect with the main line. Haskell Shull is president. His address is R. F. D. No. 3, Gilbert, S. C.

MARATHON, TEX.—Articles of incorporation have been filed for the Marathon Telephone Company, with the following named officers: J. G. Reininger, president; G. C. Miller, vice-president; W. J. Newsome, secretary, and L. L. Hess, treasurer.

FRONT ROYAL, VA.—The Liberty Corner Mutual Telephone Company has been incorporated with a capital stock of $5,000. The officers are: R. J. Stokes, president; John Derflinger, vice-president, and C. E. Brown, secretary and treasurer. The principal office will be at this place.

WINLOCK, WASH.—The Winlock Home Telephone Company has been incorporated with a capital of $5,500 by J. A. Veness, Andrew Johnson and A. W. McFee.

CASHTON, WIS.—The New Cashton Telephone Company has filed articles of incorporation. It is capitalized at $24,000, and the incorporators are: C. H. Cremer, Henry H. Cremer and Anna Schweiger.

CHEYENNE, WYO.—The Torrington Mutual Telephone Company of Torrington has been incorporated with a capital stock of $5,000, by Wm. G. Curtis, president. W. B. Coy, secretary; A. H. Mason, Albert Smith and Joseph Emery, directors.

HANNON, ONT., CAN.—The Barton & Binbrook Telephone Company has been organized here with a capital stock of $10,000. The directors are: H. Johnson and N. Laidman, Binbrook township, and T. E. Tidey, Burton township.

FINANCIAL.

NASHVILLE, ILL.—The capital stock of the Farmers' Mutual Telephone Company has been increased from $1,400 to $2,000.

MILFORD, IND.—The Royal Telephone Company has declared a 12 per cent dividend.

PAWNEE ROCK, KAN.—At the recent annual meeting of the Farmers & Merchants Telephone Company, a 10 per cent dividend was declared.

DETROIT, MICH.—The Home Telephone Company has filed in City Clerk Nichols' office a blanket second mortgage for $1,000,000, running to the Commonwealth Trust Company of St. Louis, as trustee, to secure the issue of a like amount of bonds. The

instrument states that only $600,000 of the bonds are to be sold at present, the balance to be held in reserve. The bonds are to be in the denomination of $1,000, payable in ten years, with interest payable semi-annually at the rate of 6 per cent.

HAMILTON, MICH.—The directors of the Hamilton Mutual Telephone Company have declared a dividend of 9 per cent.

LAKE CITY, MICH.—At the annual stockholders meeting of the Missaukee Telephone Company it was decided to increase the capital stock of the company from $20,000 to $40,000.

FAIRMONT, MINN.—The directors of the Fairmont Telephone Company have declared a dividend of 5 per cent payable March 1.

REDWOOD FALLS, MINN.—A semi-annual dividend of 4 per cent has been declared by the Sanborn Telephone Company.

DILLON, MONT.—The Southern Montana Telephone Company recently paid a dividend of 5 per cent and expects to pay other dividends during the year.

VALLEY, NEB.—At the annual meeting of the stockholders of the Douglas County Telephone Company a dividend of 5 per cent was declared.

CROYDON, N. H.—The Croydon Telephone Company declared a dividend of 7 per cent at the recent annual meeting.

RIVERHEAD, L. I., N. Y.—At the annual meeting of the Baiting Hollow and Roanoke Telephone Company a dividend of 6 per cent was declared on the earnings of last year.

NORTON, N. D.—The Norton Farmers' Telephone Company recently increased its capital stock to $30,000.

LE MOYNE, OHIO.—The capital stock of the Le Moyne Telephone Company has been increased from $2,500 to $10,000.

LANDIS STORE, PA.—A dividend of 5 per cent has been paid by the Mountain Telephone Company.

PHILADELPHIA, PA.—The Farmers & Merchants' Telephone Company, of Caroline and Queen Anne counties, has declared a dividend of 8 per cent.

PHILADELPHIA, PA.—There has been listed on the Philadelphia Stock Exchange $485,000 additional first mortgage 5 per cent 30-year gold bonds of the Keystone Telephone Company of Philadelphia, due July 1, 1895.

SOMERSET, PA.—The Central Telephone Company has increased its capital stock from $5,000 to $10,000.

SOMERSET, PA.—The Somerset Telephone Company has just closed the most prosperous year in its history. In addition to the regular quarterly dividend of 1½ per cent an extra dividend of ½ per cent has been declared.

GEORGETOWN, S. C.—At the regular annual stockholders' meeting of the Home Telephone Company a dividend of 8 per cent was declared.

ST. JOHNSBURY, VT.—The regular semi-annual dividend of 3 per cent has been declared by the Citizens' Telephone & Telegraph Exchange Company. This makes 6 per cent for the year past and was paid after making further addition to the reserve fund for the year equal to 10 per cent of its total income. This reserve fund now amounts to over $1,500.

RICHMOND, VA.—The Carolina County Telephone Company has been granted permission by the State Corporation Commission to increase its capital stock from $10,000 to $15,000.

BLAINE, WIS.—The St. Louis Farmers' Mutual Telephone Company has increased its capital stock from $3,000 to $6,000.

ELLSWORTH, WIS.—The Pierce County Telephone Company has increased its capital stock from $50,000 to $100,000.

GLENWOOD, WIS.—The West Wisconsin Telephone Company has increased its capital from $12,000 to $20,000.

MARION, WIS.—A 6 per cent dividend has been declared by the stockholders of the Marion Northern Telephone Company.

RESEBERG, WIS.—The Reseberg Mutual Telephone Company has increased its capital stock from $1,490 to $3,00.

BAGGS, WYO.—The stockholders of the Lower Snake River Telephone Company have decided to capitalize the concern at $10,000.

FRANCHISES.

GLENWOOD, MINN.—A telephone franchise has been granted to H. G. Hall and B. D. Templeman by the village council.

SPRINGFIELD, MO.—W. M. Mooneyham, George Norman, George O'Bryant and others have been granted a franchise to construct a telephone line along the Needmore and Republic roads, leading from Republic to Brookline.

DICKINSON, N. D.—The Belfield & Northern Telephone Company has been granted a 20 year franchise.

SOUTH HILL, VA.—A franchise to install a telephone system has been granted by the town council to Norborne G. Smith.

SPOKANE, WASH.—The county commissioners recently granted to farmers in the vicinity a 25-year telephone franchise to erect and operate a line along the highway from Moab to Newman Lake.

CONSTRUCTION.

SOLDIER, IDAHO.—Communication between Gooding and Soldier will be established within a few days by the Soldier Local Telephone Company by a line from Gooding to Fir Grove and connecting with the line from the latter place to Soldier. In the Spring the line will be extended east and west of Soldier at this end, and to Hagerman, Wendell, Glenn's Ferry, Shoshone and Jerome from the Gooding end. Over $15,000 will be expended on improvements and extensions before fall.

KINGSTON, ILL.—A new switchboard has been recently placed in the local office of the DeKalb County Telephone Company.

LEAF RIVER, ILL.—The Leaf River and Egan Mutual Telephone Company will install a new switchboard in the local exchange and also replace all poles under 35 ft. with 35-ft. poles set in cement.

ST. JOSEPH, ILL.—A switchboard having a capacity of 700 lines has been installed by the St. Joseph Telephone Company.

SCOTLAND, ILL.—The Citizens' Telephone Company is building a line to Chrisman and connection will be had with that city in a few days.

VERGENNES, ILL.—The stockholders of the Jackson County Telephone Company have authorized the purchase of a new switchboard.

BOONEVILLE, IND.—A statement was given out recently by one of the officials of the Chandler Telephone Company that work would begin within a few days on its new line to this city, where an exchange will be established.

NEW ALBANY, IND.—A telephone line has been completed from Corydon to Crandall by the Harrison County Telephone Company.

CARSON, IA.—Mr. W. J. Way, of the Carson Telephone Company has sold the system to Musson Brothers, who contemplate making great improvements in the Spring. The open wires will be replaced by cable and about $12,000 will be expended on all improvements contemplated.

MT. VERNON, IA.—The Cedar Rapids & Marion Telephone Company will rebuild the local telephone system, which they recently purchased, as soon as the frost goes out of the ground this spring. It contemplates putting in a full metallic circuit service, and otherwise improving the system.

OSSIAN, IA.—The Standard Telephone Company has put in another circuit between this place and Conover, and also between several other towns on its line.

BRINKLEY, KY.—The Sassafrac-Ball Telephone Company, recently organized, will build lines from Brinkley, via Sassafrac and Ball to Quicksand, a distance of 18 miles. Construction material will be needed for this work, which will start within a few months. James Garnett, of Brinkley, is manager.

FOLSOMDALE, KY.—At the annual meeting of the stockholders of the Home Telephone Company it was decided to install a new and larger switchboard in the local exchange.

HARLAN, KY.—The Harlan Telephone Company will build a line from Harlan via Evarts, Martin's Fork, Pansy and Black Mountain to Hagan, Va., a distance of 20 miles. Material which will be needed for the construction of this line will be purchased soon. F. G. Green, of Harlan, is manager.

SERGENT, KY.—Work will soon be commenced by the Letcher County Home Telephone Company on a local Independent line from Sergent via Craftsville, Tonney, Wright, Bentley, Ky., Pound Gap, Va., Tasso and Glamorgan to Wise, a distance of about 30 miles. W. B. Webb, of Sergent, is manager.

WHITESBURG, KY.—The Whitesburg Telephone Company will begin at once to replace its grounded line from Whitesburg to Appalachia, Va., with a metallic circuit. S. H. Fields, of Whitesburg, is manager.

HOMER, MINN.—The Homer Telephone Company recently appointed a committee to look after the development of new lines and the officers expect to construct several additional branches during this year.

RUSHFORD, MINN.—The City and Farmers' Telephone Company contemplate the building of several additional toll lines during the year.

VANDALIA, MO.—The Buffum Telephone Company is going to install a new equipment in its exchange at this place.

OMAHA, NEB.—About $900,000 has just been set aside for pushing new construction and development work of the Independent Telephone Company. Several branch exchanges are to be built, and an immediate campaign is to be inaugurated to increase the plant to 15,000 working telephones. Approximately $1,600,000 has already been expended, and the system will now be finished at a total cost of about $2,500,000.

ELY, NEV.—The White Pine County Telephone Company is contemplating extensive improvements in toll line construction so as to cover the entire mining district.

WAXHAW, N. C.—The Waxhaw Telephone Exchange has just finished moving into its handsome new two-story brick building, which cost upward of $5,000. The rebuilding the outside lines and the stringing of several hundred feet of aerial cable has been completed. A switchboard having a capacity of 300 lines has also been installed in the exchange. Mr. J. S. Plyler is proprietor and manager of the system.

MOTT, N. D.—The Dakota & Montana Telephone Company will install several exchanges along the C., M. & St. P. Railway.

CHEROKEE, OKLA.—The Rural Telephone Company is planning to install a system in Cherokee.

HARRIS, OKLA.—A new telephone line has been constructed between Harris and Black Oak in Washington county.

ENTRIKEN, PA.—The Woodcock Valley Telephone Company is running a line from Entriken to Saxton.

RENFREW, PA.—The Burton Telephone Company has installed a new switchboard in the local exchange.

LEXINGTON, S. C.—The Hollow Creek Telephone Company, recently organized, has commenced work on its line extending from the Lexington Court House to a point on big Hollow Creek, a distance of about 16 miles. It will have connections with the Citizen's Telephone Company, of this place.

PIERRE, S. D.—The Great Western Telephone Company, which was recently sold to the Gas Belt Telephone Company under the managership of F. B. Rowe, expects to install 10 exchanges and construct 500 miles of new line on the west side of the Missouri river. It also intends rebuilding the main line between Fort Pierre and Rapid City with copper wire.

JEFFERSON CITY, TENN.—The People's Telephone Company is building a line from its main office at this place to Dandridge.

LOYAH, TEX.—Plans are being made by A. G. Vanhorn, owner of the local telephone system, to entirely rebuild the town system; also overhaul the long-distance lines extending to Kent, Balmorhea, Sargosa and Pera.

ATNA MILLS, VA.—The King William Telephone & Telegraph Company is contemplating extending its telephone line from Hanover Court House to Richmond, Va.

EARL, WIS.—The Earl Telephone Company is contemplating the building of a line to Trego during the coming summer.

GREEN BAY, WIS.—The Brown County Telephone Company has just completed improvements, costing several hundred dollars, to its system in the vicinity of Cooperstown and Denmark. About ten miles of wire have been strung on the extension and 25 new subscribers added to the list.

LA CROSSE, WIS.—The La Crosse Toll Line Company will, it is reported, build a line from La Crosse to Viroqua, taking in West Salem, Bangor, Sparta, Melvina, Chaston, Westby, Chaseburg and Coon Valley.

FERNIE, B. C., CAN.—The telephone system installed by Kootenay Telephones, Ltd. is now in operation.

ALVINSTON, ONT., CAN.—The Board of Trade, J. Clark, secretary, contemplates building several rural telephone lines.

ELECTIONS.

CORNELL, ILL.—The annual meeting of the Cornell Telephone Company was held recently and officers and directors were elected as follows: President, E. A. Partridge; vice-president, William Snyder; secretary, A. E. Tiflany; treasurer, W. W. Hilton; directors, Charles Patterson and William Wheatland.

GAYS, ILL.—The Gays Mutual Telephone Company recently elected M. A. Garrett as president for the coming year. Directors were chosen as follows: J. S. Hortenstein, Eli Bennett, Umri Belden, Wm. Cross and M. A. Garrett.

MILFORD, IND.—The Royal Telephone Company has elected the following directors: J. B. Neff, L. M. Neher, C. A. Sparklin, John Defries and M. D. Neff

COLUMBIA, IA.—The Columbia Mutual Telephone Association met recently and elected as president, Frank Wood; vice-president, H. Wheaton; treasurer, J. E. Flanagan; directors, R. X. Smith, Willis Long, A. V. Whitlack, C. Maddy, J. Miller.

LA CYGNE, KAN.—The stockholders of the People's Mutual Telephone Company have elected the following officers for the current year: President, G. B. Jonas; vice-president, Robt. Lee; secretary, O. M. Priser; treasurer, C. A. Mendenhall.

LAKE CITY, MICH.—The stockholders of the Missankee Telephone Company have re-elected all the old officers. They are: President, Fred Rose; vice-president, Wm. Bartholomew; secretary-treasurer, Mrs. M. M. Peck; manager, G. S. Stout. The board of directors is made up of E. M. Bartholomew, Orville Dennis, J. E. King, G. S. Stout and Mrs. M. M. Peck.

ELLENDALE, MINN.—Stockholders of the Ellendale Rural Telephone Company have elected E. M. Thompson, president; E. F. Ellingson, vice-president; W. E. Galloway, secretary-treasurer.

HOMER, MINN.—The old officers of the Homer Telephone Company have been re-elected. They are: President, W. C. Merritt; vice-president, Frank Tainter; secretary-treasurer, J. H. Johnson.

ROLLINGSTON, MINN.—The officers of the Rollingstone Telephone Company for the ensuing year are: Henry Speltz, president; M. N. Reiland, vice-president; Andrem Rinn Jr., secretary-treasurer.

RUSHFORD, MINN.—The City & Farmers' Telephone Company has re-elected officers for the ensuing year as follows: President, M. Johnson; secretary, Peter Miller; treasurer, Chas. Greiser.

WILLMAR, MINN.—The Green Lake Union Telephone Company recently elected as officers, Oliver Larson, president; S. C. Hillman, vice-president; Wm. Olson, secretary; Oscar Hillmar, treasurer; directors, Port McDowell, Iver Hokom, Sam Anderson.

DODGE, NEB.—The Fairview Telephone Company held a meeting recently and elected Joe Mestl president and Joseph Stubbert a director.

CORTLAND, OHIO.—The Farmers' Telephone Company elected the following directors at the recent annual meeting: W. A. Cram, Jay E. Bascom, R. F. Moran, F. E. Alling and A. H. Goff.

DAMASCUS, OHIO.—The stockholders of the Damascus Telephone Company recently re-elected the old board of directors. The members are: Dr. A. R. Cobbs, L. F. Pearce, E. E. Walker, Joseph Whinery and George Kinsey.

MIDDLE POINT, OHIO.—Directors of the Middle Point Telephone Company have been elected as follows: John Stemen, Wm. Feaster and W. H. Pollock.

RIPLEY, OHIO.—Stockholders of the Boughtonville Telephone Company recently elected directors for the ensuing year as follows: F. E. Hole, J. A. Palm, W. A. Garrett, S. E. Gleason, G. B. Silliman, G. W. Tooker, J. D. Sparks, E. A. Van Buskirk and E. A. Stotts. The officers are: President, F. E. Hole; vice-president, W. A. Garrett; secretary, G. W. Tooker; treasurer, G. B. Sillihan.

TONTOGANY, OHIO.—The Tontogany Telephone Company which recently closed a successful year's business, has elected officers as follows for the ensuing year: President, Henry Heubner; vice-president, W. H. Hannah; secretary, J. S. Phillips; treasurer, Joe Reams; directors, Thomas Felsted, John Wenig, I. N. Wade; manager, Thos. Felsted.

URBANA, OHIO.—The annual stockholders' meeting of the Urbana Telephone Company was held recently and the following directors were chosen: C. H. Marvin, J. I. Blose, E. E. Cheney, R. H. Murphy, J. C. Powers, I. N. Keyser, J. H. E. Dimond, J. R. Hughes, T. T. Brand, L. T. Blose and J. F. Brand. The board has organized as follows: President, C. H. Marvin; vice-president, J. I. Blose; secretary, E. E. Cheney; treasurer, J. C. Powers. ningham, C. Pew and James E. Street.

WESTON, OHIO.—At a recent meeting of the Home Telephone Company, the following officers and directors were elected: President, G. W. Potter; treasurer, Lewis Toan; directors, M. B. Metzger, Ed. Guyer, W. F. Shipman, Eber Junkins, Lon Hull, J. C. White retains the secretaryship.

YORK, OHIO.—The Farmers' Telephone Company met recently and elected J. D. Coe, Richwood, president; Mr. Van Linning, East Liberty, vice-president; Wm. Plotner, Byhalia, secretary; James Thomas, Lunda, treasurer. John Moore, West Mansfield; Benjamin Hurd, East Liberty; Harrison Longberry, Long Branch; Henry Inskeep, York; Arlie Coon, Byhalia; Bert Jolliff, Flat Branch; Will Warrick, Lunda, and Nate L. Moffitt, of York, directors.

SOMERSET, PA.—The Somerset Telephone Company at its annual meeting elected the following officers: President, A. F. John, of Wayne; vice-president, F. W. Biesecker, Somerset; secretary, Josiah Swank, Somerset; treasurer, H. M. Berkley, Somerset; geenral manager, H. T. Staub, Meyerdale.

SHERMAN, TEX.—Stockholders of the North Texas Telephone Company held their annual meeting recently and elected the following directors: S. W. Porter, S. D. Donaho, C. A. Shock, Hayden W. Head, N. B. Birge, James Biggs and T. F. Rogers. The directors selected officers as follows: President, S. W. Porter; vice-president, S. D. Donaho; secretary-treasurer, C. A. Shock.

HARTFORD, WIS.—The Hartford Rural Telephone Company, recently incorporated, has elected the following officers: President, E. M. Anderson; vice-president, Daniel Schultz; secretary, A. W. Brown, and treasurer, Michael Reik.

PEWAUKEE, WIS.—The officers elected by the Pewaukee-Sussex Telephone Company, to serve for the ensuing year are: President, James Weaver; treasurer, Edwin Haskins, and secretary, J. I. Gates.

MISCELLANEOUS.

TWIN FALLS, IDAHO.—Owing to the raise of rates by the Rocky Mountain Bell Telephone Company, which went into effect the first of the year, a movement has been started to organize an Independent telephone company.

CHICAGO, ILL.—Frank F. Fowle, the consulting electrical and telephone engineer, has just completed an appraisal of the telephone system of the Palmer-Darnall Electric Company, McLean, Ill. This is a company having about 700 telephones, with exchanges at McLean, Atlanta, Armington and Randolph, and local toll lines. The appraisal was made to check up the system and furnish accurate information of its standing to the company.

PRINCETON, IND.—The city attorney is preparing a bill to be introduced in the legislature for the enactment of a law providing for the payment of telephone tolls by the police department of a city in capturing fugitives from justice, the city of Princeton having refused to pay a toll bill to the Cumberland Telephone Company.

MT. VERNON, IA.—The Mt. Vernon telephone system has been sold to the Cedar Rapids & Marion Telephone Company, who assumed charge February 1.

PIERRE, S. D.—The Great Western Telephone Company has sold its lines in Sully and Hughes counties to the Gas Belt Telephone Company.

GONZALES, TEX.—The Gonzales Telephone Company suffered a great loss to its lines by a recent fire. Out of 14 rural lines running out of the city only four were left in working order.

CLARKSVILLE, N. Y.—The Clarksville Telephone Company, recently organized, has chosen the following officers and directors: President, J. Harris Loucks, secretary-manager, Charles T. Joslin; district manager, Charles S. Shear. Directors, J. Harris Loucks and John S. Loucks, New Scotland; Charles T. Joslin, Andrew W. Joslin and Frederick Crebel, of Feurabush; Albert Vanderpoel and David Bennett, of New Salem.

NORTON, N. D.—The stockholders of the Norton Farmers' Telephone Company have chosen G. Langland, Gilbert Erickson, A. G. Bylin, Peter Hjelmstad, Charles McLean, John Rorvik and A. B. Flom as directors of the company.